

# FLIGHT

THE AIRCRAFT ENGINEER

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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## Flight

and The Aircraft Engineer

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## EDITORIAL COMMENT



HERE seems to be a wave of economy—or of Spring madness—sweeping over the Hotel Cecil, and the trouble is that it appears to be totally misapplied. The latest manifestation takes the shape of an Air Council Order, announcing that all acting ranks are to disappear as from May 1. Now, as most of the officers at present employed in the R.A.F. hold acting rank superior to their substantive appointments this means that a very large number of officers will find themselves reduced in rank and in pay for no discernible reason save that of financial economy. We are wholeheartedly in favour of every reasonable and proper economy that can be effected in the R.A.F. or in any other State Department, but we hold at the same time that these economies should begin at the right

### An Injustice and an Anomaly

end and should not cause undue suffering to men who have served the country right well during the war and who have a right to prior consideration. If a start had been made with the civilian staffs of other Departments, and an all-round reduction of pay made on the ground that the country simply cannot afford to properly remunerate people for the work they do, there would be nothing to be said about this latest anomaly. But nothing of the sort has happened, or could happen, for the very sufficient reason that the civilian staffs are not under military discipline and simply would not stand it.

Here, in the R.A.F., we have officers who have been given acting rank and the pay of it in order that they may carry out work which, under the ordinary routine of the Service, can only be done by senior officers. Now, if that work is of what we may term a senior nature it surely follows that the pay should be in accordance with its character. Nor is it the case that the pay in question is of such princely amount, in comparison with civilian pay for the same work, that it is in the nature of a scandal. Indeed, the contrary is the case, since it is notorious that Service pay is barely adequate to keep body and soul together. Apart from the question of pay, the Order in question is simply Gilbertian in its effects—it would be funny if it were not that it sheds so peculiar a light on official methods of thought. There are officers of the rank of captain who have been appointed to be "G.S.O. 1, and to be lieutenant-colonel whilst so employed." Under them are serving officers of the substantive rank of major. Now, the Order "washes out" the acting rank, but not the appointment, so that we shall now see the comic, if rather unedifying, spectacle of senior officers serving under their juniors in rank and taking orders from them by virtue of the appointments held by the latter, while they draw better pay than the men under whom they are employed! Who, we wonder, is the genius who evolved this wonderfully brilliant idea? Really, we do not know whether to laugh at the absurdity of it all, or to weep for the exhibition of hopeless want of thought, to give it no harsher name. It may be that by the time these lines appear in print the hopelessness of the situation created will have been realised by the Air Council and steps taken to rescind an Order which is futile and absurd. We sincerely trust it may be so.

### Another Anomaly

Our attention has been directed to another anomaly existing in the R.A.F., which should be adjusted without delay. In the Memorandum constituting the Force, it was distinctly laid down that no officer or man transferring to the newly created R.A.F. should suffer in pay, pension or rewards by such transfer. How this undertaking is interpreted may be gathered from the following. When a wound gratuity is assessed, it is based on the period of "unfitness for general service," viz., from the time of admission to hospital to the date of the officer being passed by a medical board as fit for general service. Now, the Army passes officers placed by medical boards in Category C 1 as being fit only for home service. The R.A.F. procedure is to pass all officers in Category C 1 as being fit for general service for "ground duties" only. Obviously, this makes a great difference in the assessment for wound gratuities. The Army officer may be discharged from hospital after recovering from wounds and be passed fit for home service, sent to a camp or station, and remain in Category C 1 for months before a board will pass him for general service, while the R.A.F. officer may be passed straight out of a convalescent home to "general service, ground duties." In the one case the officer might get a substantial sum as gratuity and in the other nothing at all. The main point seems to be that under the regulations of the R.F.C.—the Army—the first procedure was recognised, but under the R.A.F. the second is adopted. Clearly, then, the officer who is wounded on service is likely to be victimised by not receiving the gratuity to which he would have been entitled had the R.F.C. remained under the control of the Army, and this certainly amounts to a violation of the undertaking given in the Memorandum to which we have referred. We are not apportioning blame in the matter. It seems to be one of those errors in procedure which is very likely to happen when a new force is created in the circumstances in which the R.A.F. was brought into existence and we feel assured that the matter only wants to be brought to the notice of the proper authority for it to be altered and brought into line with the understanding—the distinct pledge, in fact—given to officers and men on transfer to the R.A.F. from other branches of the Service.

### Civilian Flying

In connection with the removal of the ban on civilian flying, which nominally took effect to-day (May 1) the Air Ministry has issued an important statement, which we print in full elsewhere. The statement sets forth that there must ensue a period during which regulations are being studied and applications are being made by firms and private individuals for the licensing of pilots and registration of aircraft. In a word, there must be an interval of probation and preparation, so to say, while people are making ready for the great change which will ultimately come over the whole face of transport consequent upon the perfecting of aerial facilities. In order that every assistance may be given to those intending to take advantage of whatever facilities are offered by the Government, certain details of some of the aerial routes of Great Britain which it is proposed to throw open to civilian aviation are made public in the statement quoted. The Air Ministry, however, makes it clear that these routes are merely provisional,

since practical experience alone can show if the selected stations are rightly placed. Selection and decision have been limited by existing conditions. Certain aerodromes are in being and in order to start civilian aviation as soon as possible, and also for the sake of economy, it is necessary to make use of what already exists. This is eminently sound and logical and shows that the Department of Civilian Aviation has a true appreciation of the need to get to real work as quickly as possible, while not being in too much of a hurry to get to the end of things.

It is recorded for information that at the time the Armistice was concluded there were in Great Britain and Ireland no fewer than 337 aerodromes and landing grounds. Of these 116 have already been released for cultivation, etc., while about 100 will be required for the purposes of the R.A.F. There remain, therefore, about 120 aerodromes and landing grounds which will ultimately be available for the purposes of civil aviation. The accompanying map indicates the principal main routes it is proposed to open up at once. It must be said that these routes do not by any means seem to be the most ideal from the point of view of commerce, since they leave out many important centres which must ultimately be served by aerial post and passenger services, but that cannot be helped in the meantime. The routes have been chosen with reference to the existence of military aerodromes, which is quite the best method of projection that could have been adopted in present circumstances. Once a particular route has been declared open, the pilot of an aeroplane making the journey will find petrol, some accommodation, and where possible mechanics to handle his machine at each of the air stations named. The practical value of the intimation lies in the fact that any individual who complies with the terms of the regulations is now at liberty to fly along these civil air routes and to make use of the stations and facilities afforded. It is not made clear whether in the meantime the Air Ministry intends to lay down a scale of charges for the accommodation and assistance indicated, or whether for the sake of encouraging the movement during its first infancy these will be placed at the disposal of firms and individuals free of cost to themselves. It would be useful to have a statement as to this point. We should say it would be a graceful, as well as an extremely useful, concession to allow the use of these facilities without charge for the first few months at least.

### Overseas Traffic

The statement lays down that the control of traffic passing to and from overseas cannot but prove a difficult problem. The whole question has been discussed between the Air Ministry, the Home Office and the Board of Customs and Excise, and it has been provisionally decided that the aerodromes which can be used for the purposes of such control, called "appointed" aerodromes, shall for the present be limited to four in number and, with the exception of the London terminal aerodrome at Hounslow, be on the coast. They are as follows:—

For Continental traffic—Lympne in Kent.

For Dutch traffic *via* Harwich—Hadleigh in Suffolk.

For Scandinavian traffic *via* the Humber—New Holland in Lincolnshire.



## Flight - And the Men



Mr. T. O. M. SOPWITH, Chairman of the Sopwith Aviation and Engineering Co., Ltd.

For traffic direct to London—Hounslow in Middlesex.

At these "appointed" aerodromes all outward and inward-bound aircraft must land for examination of goods and passengers. The point has been urged that these aerodromes would be better situated inland, since much of the time gained by aerial transit will be lost if examination has to be carried out immediately on crossing the seaboard. The difficulties of control have, however, decided the Air Ministry in favour of the coast examination stations, provisionally at least, but for the convenience of pilots flying direct from the Continent to London, one "appointed" aerodrome has been placed at Hounslow, whence pilots can proceed after examination direct to their destination. The fixing of the "appointed" stations is by no means final either as to number or situation. If sufficient trade and air traffic should grow up in any other direction, the question will be reconsidered and "appointed" aerodromes established as necessary at other centres. The final note is one of encouragement. It is remarked that hitherto much of the progress in aviation has been due to war and war conditions, and it follows that at first the majority of machines used in civil aviation will be either actual war machines or war models adapted. But types more suitable for pleasure and commercial work are already beginning to make their appearance, and for them, as has been the case with the earlier war models, rigid care and supervision in regard to construction and airworthiness will have to be insisted upon for the safety of the travelling public and also the public which does not travel. For this duty the Air Ministry will continue to be responsible. It will not in any way hinder development by imposing inspection on inventions or purely experimental machines, but it will insist upon the inspection and certification for general airworthiness of any passenger machine plying for hire. Not only the machine but also the pilot who carries passengers and the aerodrome where he lands will be liable to periodical inspection, and if they are not passed as fit the license is liable to be withdrawn.

Not the slightest exception can be taken to this. In fact, it is neither more nor less than what is required for the purposes of the public safety. To insist upon less would be to risk, if not to invite disaster, while to impose more would be to set a handicap upon development which would have a distinctly retarding effect on progress. We think that, on the whole, the Air Ministry is to be congratulated upon having issued an admirably clear and lucid statement of the general conditions under which civilian aviation will be conducted in the immediate future. Obviously, the Department of Civil Aviation has still to feel its way to a very great extent and if the statement just issued seems to lack the air of finality in its details, that was only to be expected under the circumstances. Indeed, to have attempted anything in the shape of finality at present would have been merely futile and have given rise to the feeling that the Ministry was out to hamper rather than to encourage the movement, and it has therefore very wisely made the expression of its intentions as general in terms as possible without making it indefinite to the point of uselessness. It has certainly erected a most important landmark in the history of aviation, in that this is, so far as we are aware, the

first general document of the kind that has ever been issued by any Department of State in the world. There have been laws and regulations for the conduct of aerial traffic, but not of a serious commercial character such as the Air Ministry's statement endeavours to deal with now. Formerly these regulations dealt with what was merely an infant sport, with certain potentialities for the future of which no one could foresee the fruition. Now we are dealing with what is practically an accomplished commercial fact and with a development from which, while we cannot see the end, we know the greatest results will accrue to the benefit of civilisation.

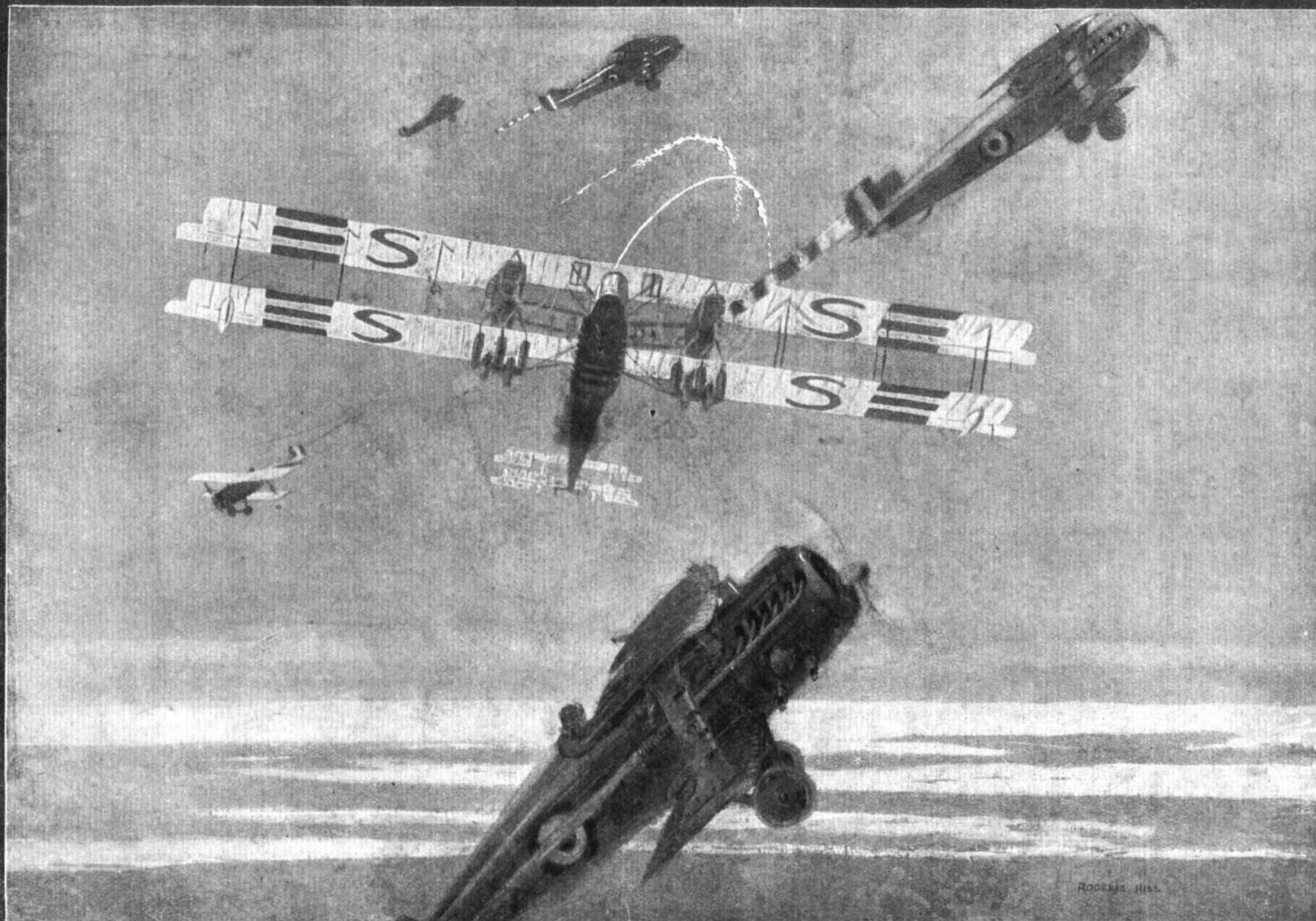
#### Britain's Air Effort in the War

A Parliamentary Paper has just been issued, under the title of "Synopsis of British Air Effort during the War," which reviews briefly the history of the development and doings of the British Air Services during the past five years. The text of the Paper will be found in another part of this issue of FLIGHT. It is impossible to single out any outstanding details for comment, inasmuch as the story is not one of individual action, either by units or smaller entities of the Services, but simply a running record of service and development. It is, nevertheless, interesting to note that the outbreak of war found the British Air Service consisting of a total of 272 aircraft, of which 93 belonged to the R.N.A.S. and 179 to the R.F.C., while the total personnel of the two wings was 197 officers and 1,647 other ranks. In October of last year these totals had grown to 199 squadrons with a personnel of 27,906 officers and 263,842 other ranks. The total number of machines "on charge" at the same time was 22,171 and of engines 37,702. From August, 1914, to May, 1915, a period of 10 months, the output of machines was 530 and of engines 141. During the 10 months from January to October, 1918, the respective totals were 26,685 machines and 29,561 engines. It is figures like these which indicate, as nothing else can, the real magnitude of our effort to obtain aerial supremacy over the enemy and the wonderful manner in which our manufacturing resources were adapted to that end.

The table showing the result of operations in the air is at once interesting and informative. It indicates very well to what an extent we had established a definite superiority over the Boche. The number of enemy aircraft accounted for, *i.e.*, brought down or driven down, was 7,908 on all fronts, at a cost to ourselves of 2,810 machines "missing." Incidentally, now that the War is over there can be no harm in asking that the precise method of announcing our losses of aircraft should be disclosed. According to the table we have quoted, we lost about a third of the number of machines which were lost by the enemy, but this statement does not tally with the official German figures, which we have often found to be surprisingly correct. The question is, do these machines returned as missing represent our total aerial losses? Obviously, if a machine is crashed behind our own lines, we know what has become of it—it certainly is not "missing." Perhaps the Air Ministry will now take heart of grace and tell us exactly what our aerial losses were during the war.

The section of the Paper dealing with the assistance given to the Allies is extremely interesting. Not a single one of the Allied Powers but is indebted to





# FLIGHT IN THE NEAR FUTURE:

(From an original drawing by Roderic Hill)

An incoming aeroplane carrying merchandise being subjected to an examination by a patrol of fast scouts. When she has answered the necessary signals, she will be allowed to proceed to the coastal aerodrome, where she will land and show her papers.

Great Britain for more or less assistance either by way of machines supplied or in the training facilities extended to their pilots, so that in addition to our own heavy direct contribution to the aerial arm, this country also did magnificent work in assisting her Allies to develop their own Services. In fact,

the whole Paper from beginning to end is a plain, matter-of-fact record of an astonishing effort put forth with the whole strength of our resources and of a development starting from practically nothing and which reached a prodigious size by the end of the War.

#### The Honours List

THE Prime Minister's list of Honours, publication of which was deferred at the New Year, which was issued on Monday, contained the following:—

*To be Viscount.*

The Right Hon. Harold Sidney, Baron Rothermere. Director-General, Royal Army Clothing Department, 1916-17, Air Minister, 1917-18.

*Baronet.*

Samuel James Waring, Esq., High Sheriff of Denbighshire. Public and local services.

#### Prince Albert's Progress

PRINCE ALBERT, who is taking the ordinary course of instruction in flying at the Wallington Aerodrome, near Croydon, is making good progress, and is now occasionally accompanied on his flights by the Prince of Wales. While manifestly enjoying the flights, and incidentally learning a good deal about airmanship, the Prince of Wales, for the time being, has not in view the definite aim of his brother—to qualify for a pilot's certificate.

#### An Australian Air Force

MATTERS in connection with the establishment of an air force in Australia appear to be proceeding apace. It is estimated that the initial cost will be £500,000, and that

the annual pay and general maintenance costs will amount to a similar sum. It is understood that the scheme is receiving the enthusiastic support of the British Government, which is making a free gift of 100 of the latest design aeroplanes, balloons and airships to the Commonwealth.

#### Relations between the Army and the R.A.F.

AN Army Order just issued states that the following direction has been given by the Army Council:—

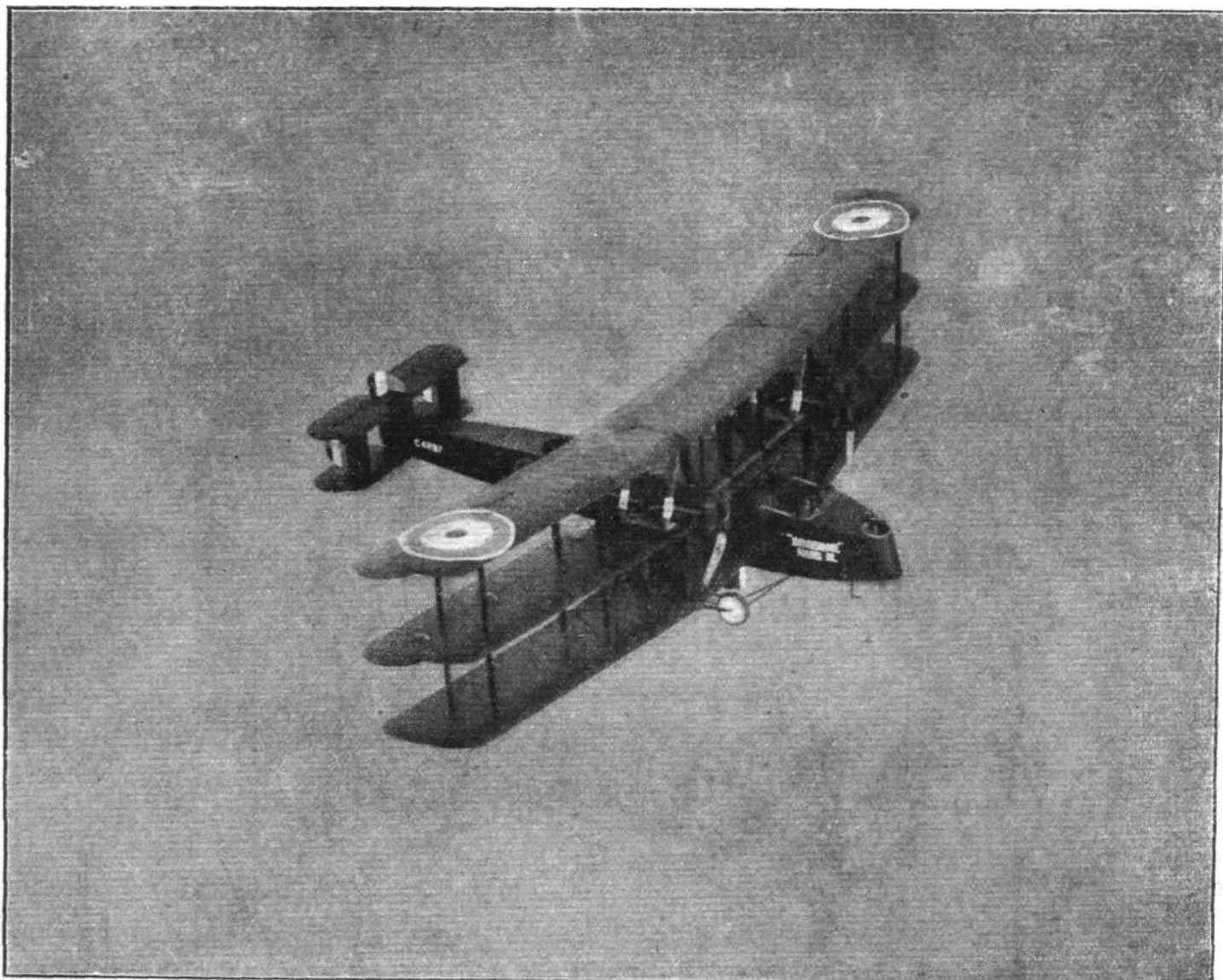
"The following officers of the Regular Forces shall be temporarily attached to the Regular Air Force, namely: Any officer of the Regular Forces who is instructed to serve with a unit of the Regular Air Force and is taken on the strength of such unit while serving with and on the strength of any unit of the Regular Air Force."

A similar direction by the Air Council, relating to the temporary attachment of officers of the Regular Air Force to the Regular Forces, has been given by the Air Council.

#### Aeroplane for the South Pole

It is proposed to include an aeroplane in the equipment of the expedition to the Antarctic which is to be made under the leadership of Mr. John L. Cope, F.R.G.S., who accompanied the Imperial Trans-Antarctic Expedition, 1914-17, as surgeon and biologist to the Ross Sea party.

The expedition will leave this country in June, 1920, in the "Terra Nova," and return in 1926.



"Braemar II," the huge Bristol triplane one-time bomber, now converted for passenger-carrying and commercial purposes, in flight during the Easter holidays. Photographed from an attendant Bristol two-seater



## DRAWING OFFICE DATA

By E. O. WILLIAMS, B.Sc.Eng. (Lond.), Assoc. M. Inst. Civil Engineers, Assoc. Fellow R.Ae.Soc.G.B.

(Continued from page 544.)

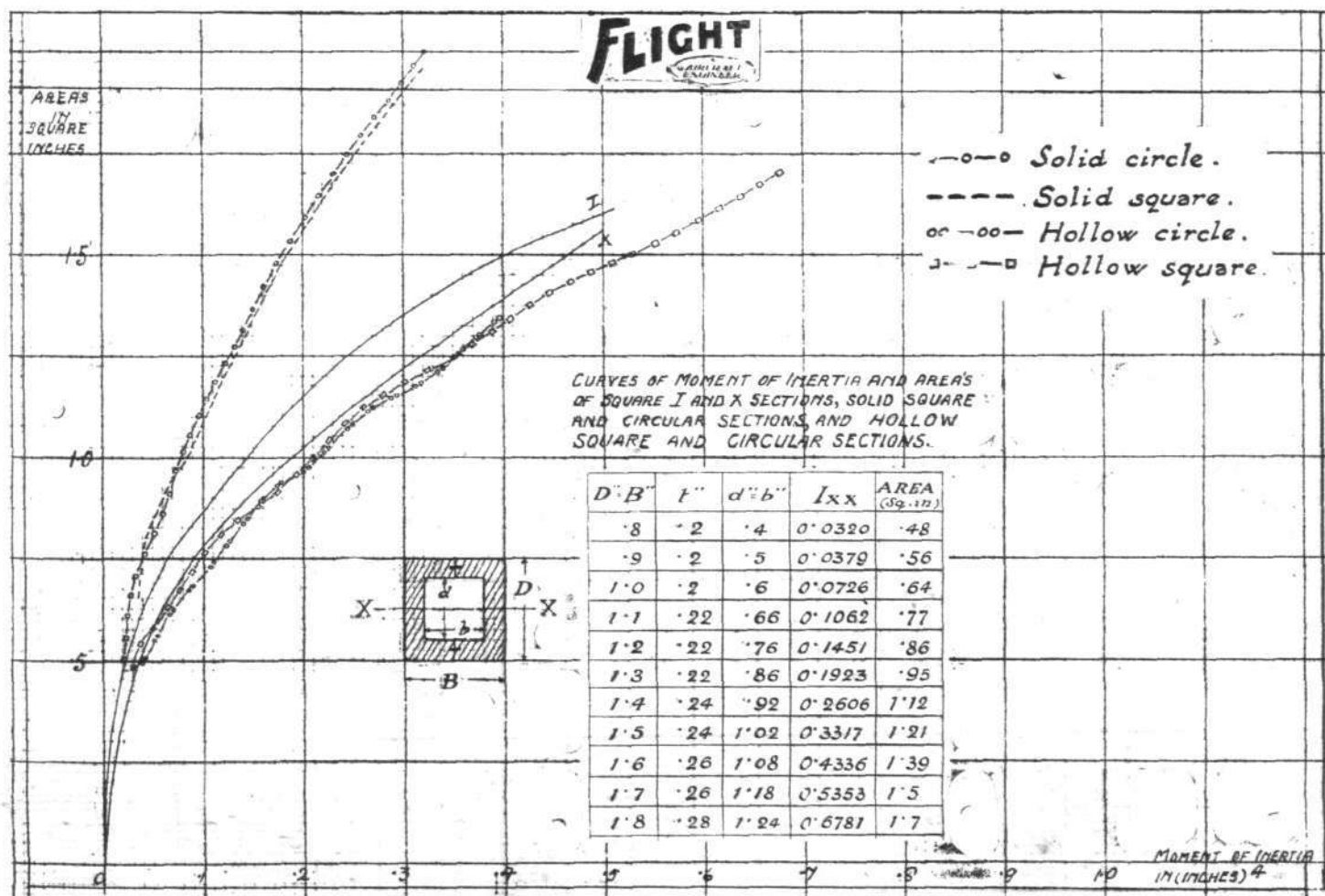
IN the foregoing it has been shown that for a given overall size the X section possesses a higher moment of inertia than the I section of the same size. This was particularly so with sections of 1.6 in. square to 2 ins. square, or in other words for sizes such as may be conveniently used in the construction of body struts. It may now be of interest to examine how such sections compare from the point of view of strength for area. In Fig. 25 curves of areas for the two sections have been plotted against a base of moments of inertia. The superiority of the X section is at once apparent. Thus, for a moment of inertia of .3 the X section has an area of 1.225 sq. in., while the area of the square I section, having the same moment of inertia, is seen to be 1.35 sq. in. This represents a not inconsiderable saving in weight, and further confirms the assumption that the X section should be more extensively used.

Up to the present comparison has only been made with a square I section. This is not, perhaps, quite fair since the I section in which  $B = D$  is not the most economical, inasmuch as it has a much smaller value of  $I_{yy}$  than of  $I_{xx}$ , or, in other words, is too deep in proportion to its breadth. A fairer comparison to make would be between an X section and an I section having approximately the same moment of inertia around both axes. From the tables of moments of inertia and areas of I sections (Fig. 12) it was found in a previous numerical example that a *longeron* of I section, having a depth of 1.1 in. and a breadth of 1.5 in. had moments of inertia of

$I_{xx} = .1538$  and  $I_{yy} = .1552$  respectively, *i.e.*, practically the same moment of inertia around both axes. The area of this section was found to be 1.05 sq. in., and its strength calculated to be—for a length of 20 ins.—3,700 lbs.

The tables in Fig. 26 show that by choosing an X section measuring 1·6 in. square, which has an area of 1·067, or slightly greater than that of the I section considered, and, therefore, adequate in the strut formula, we obtain for the X section a moment of inertia of ·2168, which is very considerably above that found for the I section. Since there is nothing like a numerical example for bringing home how much this amounts to, we will see what strength this higher moment of inertia will give for the *longeron* in the previous example. The fact that it has been pointed out that the X section is less suitable for *longerons* than for struts does not greatly affect the argument, since the sections might equally well apply to struts of the same length and carrying the same load.

Without going to the trouble of working out the complete example, it will be sufficiently accurate to assume that the area has remained the same. This is not quite true, but the difference is only small, 1.05 and 1.067 respectively, and the effect will only be to give a slightly too low figure for the strength of the strut. Assuming then that the area has remained unaltered, the strength of the two sections as struts is proportionate to their respective moments of inertia, on strength of 20-in. strut of X section 1.6 in.



**Fig. 25.**

with the 3,700 lbs. strength found for an I section strut of the same length and area (which, of course, is merely another way of saying of the same weight), this figure promises exceedingly well for the X section.

Up to now we have only considered the advantages of the X section from the point of view of strength. No less important is the question of manufacture, and a few brief notes on this subject may not be out of place. Reference to the section in the upper left-hand corner of Fig. 26 shows that as the X section is symmetrical the four hollowed-out portions are all alike, *i.e.*, of an angle of 90 deg. and a radius of .2 in. at the bottom of the channelling. This means that one set of cutters for the spindle machine will suffice for the four sides of the strut, a considerable advantage, since a number of cutters can be made from the same template.

It will further be seen that if the cutters are originally made sufficiently large, they can be used for struts of all sizes, the angle being 90 deg. The thickness  $y$  can, with the same cutters, be made anything desired by choosing suitable stops when spindling, thus pushing in the cutters to a greater or smaller extent. As a manufacturing proposition, therefore, the X section easily holds its own against the I section, so that any way one looks at it the X section may be said to lend itself extremely well to aeroplane construction.

Before leaving the subject of the X section, it may be advisable to point out that where this section is employed for very long struts there might be a danger of the flanges  $y$  (Fig. 26) buckling before the load on the strut reaches the value calculated by the usual strut formulæ. To prevent this, webs should be provided at intervals, the distance between webs

clearly depending on the thickness  $y$ . The writer suggests that a web distance of not greater than 40 times  $y$  will be sufficient to prevent buckling. For the numerical example just given this web distance would amount to  $\cdot 26 \times 40 = 10\cdot 4$  ins., so that for safety there should be left a web in the centre of the free length of strut, which was 20 ins.

(c).—*Square and Circular Sections (Solid and Hollow).*

The comparisons made have, up to now, only included the I and X sections. To compare every conceivable section possible would be out of the question in an article like the present, but there are some which are in general use, and which will therefore, be included in the comparison of sections. These are the solid and hollow square sections, and the solid and hollow circular sections. In Fig. 25 curves have been plotted for these sections. As a basis for comparison were chosen solid, square and circular sections, ranging from .8 in. square and .8 in. diameter respectively to 1.8 in. square and 1.8 in. diameter respectively. In the case of the hollow sections the thickness of the walls of both square and circular sections ranged from .2 in. to .28 in. in the manner shown in the table in Fig. 25. From these curves it will be seen that the solid square and solid circular sections are very inferior to both I and X sections, the two curves indicating that there is little to choose between the square and the circular section. So also in the case of the hollow sections, the curves for which practically coincide. Both are, however, superior to the others considered. This indicates the advantages attending the employment of hollow sections for struts of the overall sizes considered. Of the two, the hollow square section is already very extensively used, whereas the hollow circular section is not greatly favoured where wood

**Fig. 26.**



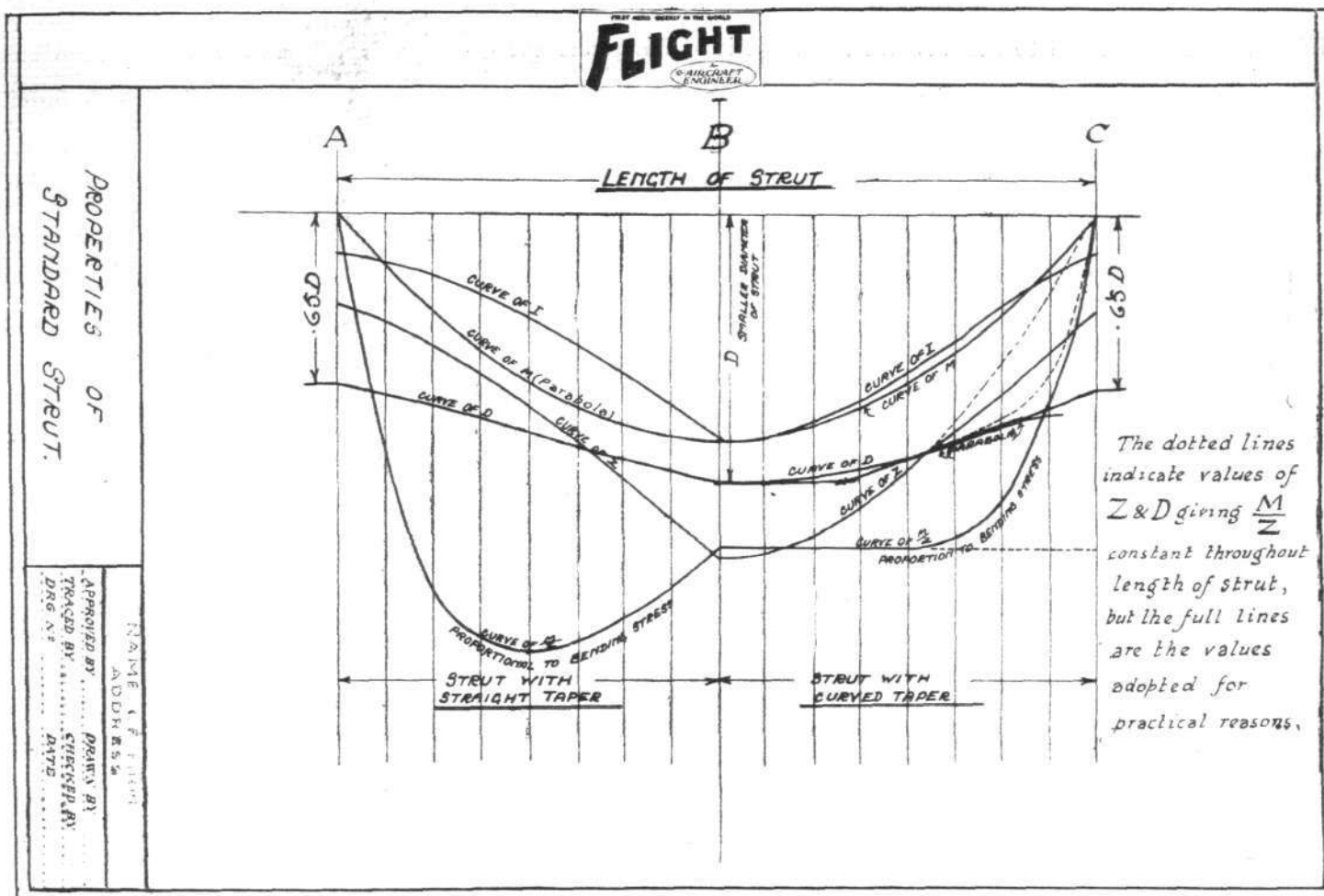


Fig. 27.

is the material. This is due to difficulties in manufacture, which are to a certain extent against its general employment. The same applies, although in a smaller degree, to the hollow square section, of which the two halves have to be spindled out and grooved, a hardwood tongue being inserted in the groove and the whole glued together and, in most cases, wrapped

with fabric. Thus, production is considerably slower than that of sections needing spindling only. As a compromise between the most efficient section and ease of manufacture, the X section, therefore, would appear to have undoubted advantages, being nearly as good as the hollow sections, and much quicker to manufacture.

#### IV.—STREAM-LINE STRUTS.

In addition to the struts of various sections employed internally in an aeroplane, there are others which are left exposed to the air, and which, therefore, have to be of stream-line section in order to reduce their head resistance. These include the struts of the undercarriage and the inter-plane wing struts. An examination of modern aeroplanes reveals considerable variety in the proportions of the stream-line sections employed, but as one can only include a limited number of sections the two most usually employed—having fineness ratios of 4 to 1 and  $3\frac{1}{2}$  to 1 respectively—have been selected for the purpose of these notes.

Apart from the question of fineness ratio, which is largely a compromise between aerodynamical and constructional desiderata, there is the problem of the longitudinal shape of these struts, modern machines showing straight, tapered, and curved struts. We shall first examine the

##### Strength of a Tapered Strut

CASE I.—It is assumed that the strut tapers with a straight taper from centre to end, and that the dimensions at the ends are .65 times the corresponding dimensions at the centre of the strut. Portion A to B in Fig. 27 represents this case. For any strut, the least moment of inertia  $I$  equals  $K \times d^4$ , and hence the section modulus  $Z$  equals  $2Kd^3$ . When, as in this case, the variation of  $d$  throughout

the length of the strut is given, we can evaluate and plot curves, showing the variations in  $I$  and  $Z$ , and these are shown plotted in Fig. 27.

When a strut buckles and fails, the stresses are for the main part due to the bending moments induced in the strut. Fig. 28 shows a strut buckling. The bending moment at any point is equal to  $F \times x$ . If it is assumed that the strut buckles to a parabolic shape, the bending moment diagram is also parabolic, and such a curve is shown plotted in Fig. 27.

The bending stresses are proportional to  $\frac{M}{Z}$ , and by dividing the ordinate of the bending moment curve by the corresponding ordinate of the  $Z$  curve, the curve of  $\frac{M}{Z}$  or bending stress is obtained. For the straight taper, the  $\frac{M}{Z}$  curve has a maximum

ordinate at about the quarter points, indicating that these are the weakest sections, and that this type of strut is inefficient.

For uniform strength throughout the length of the strut  $\frac{M}{Z}$  should be as nearly constant as possible.



Fig. 28.

Referring to the BC portion of the diagram (Fig. 27), first plot a line parallel to the base line, and call it  $\frac{M}{Z}$  of constant  $\frac{M}{Z}$  curve. By working backwards from this curve, a We shall assume, as before, that the bending

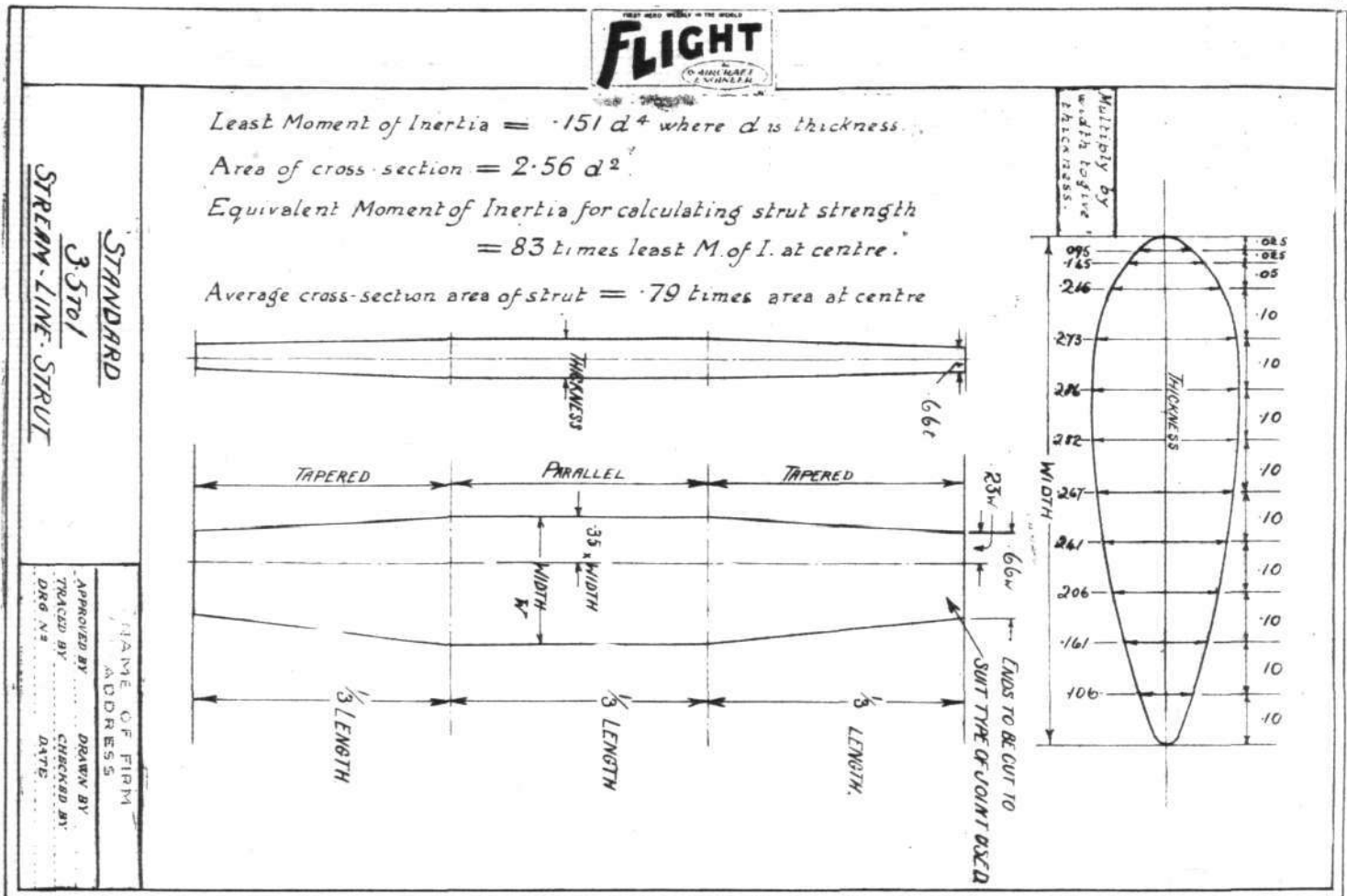


Fig. 29.

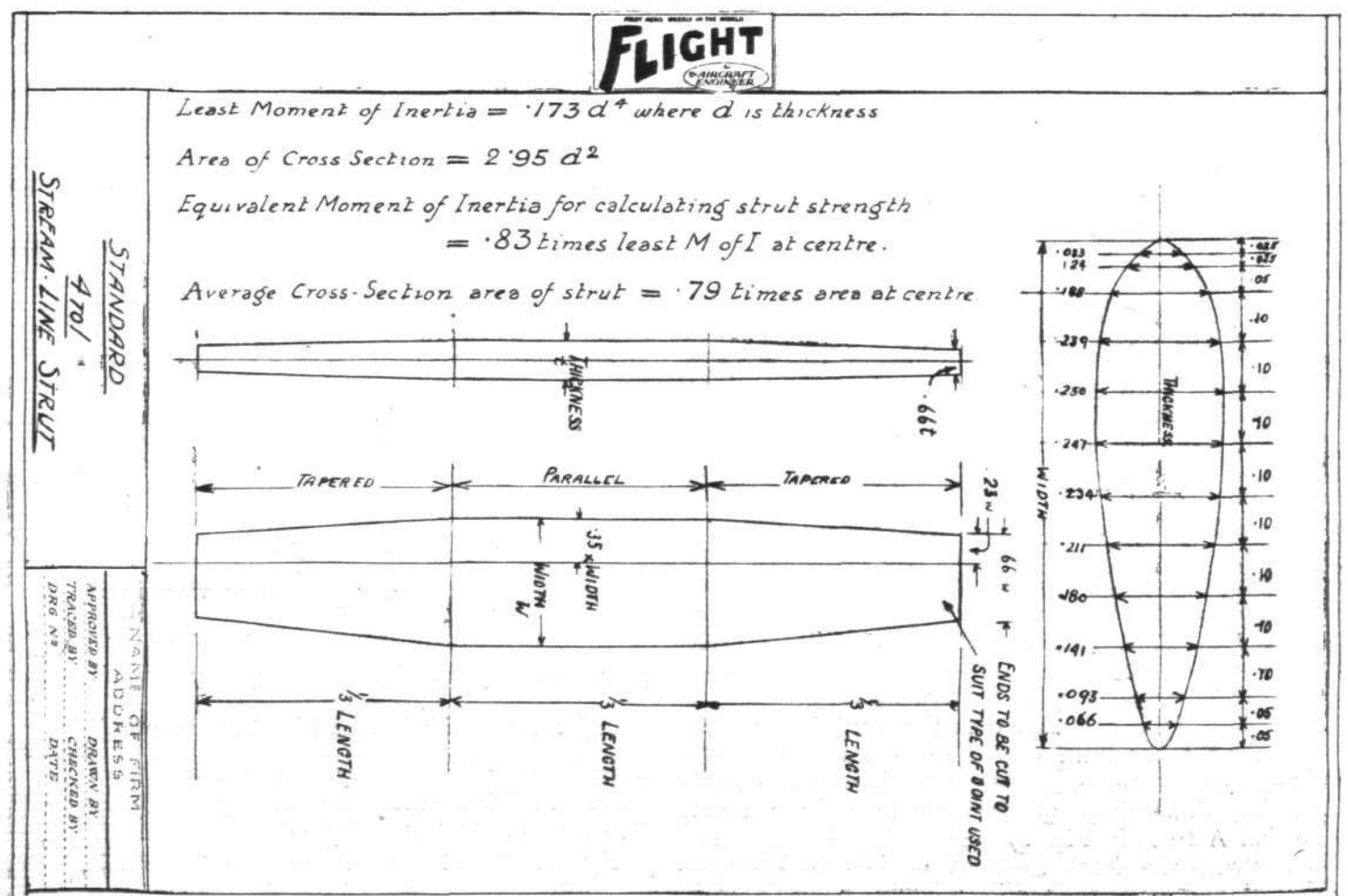


Fig. 30.



moment of  $M$  varies as a parabola. By dividing the ordinates of the  $\frac{M}{Z}$  by the corresponding ordinates of the  $M$  curve, values for  $Z$  can be obtained. Now  $Z$  equals  $2Kd^3$ , and hence from the  $Z$  curve values of  $d$  can be obtained giving the ideal tapered strut.

In the diagram the ideal values of  $d$  are shown in dotted lines. The end portions of such a strut would be impracticable. A parabola, having an ordinate at the end equal to .65 times the centre ordinate, can be made to include the centre portion of the ideal curve of " $d$ ." Alternatively, the centre third of the strut can be made parallel, and the ends tapering with straight tapers to ordinates .65 times the similar ordinates at the centre. Such a strut approximates to the ideal strut.

The strength of a tapered strut compared with a parallel strut can be approximated as follows: For the ideal strut  $\frac{M}{Z}$  and  $\frac{M}{I}$  are practically constant for the middle half of the strut. If such a strut were subjected to a uniformly distributed load of  $W$  lbs.,

its deflection would be  $\frac{WL^3}{64EI}$  where  $I$  is the moment of inertia at the centre.

A parallel strut of moment of inertia  $I_p$  would, if subjected to the same loading, deflect  $\frac{5WL}{384EI_p}$ .

For equal stiffness of parallel strut and tapered strut

$$\frac{5WL^3}{384EI_p} = \frac{WL^3}{64EI} \therefore I_p = .83I.$$

Therefore, a parallel strut of equal strength has a moment of inertia at its centre equal to .83 times moment of inertia at centre of tapered strut.

Hence, in Euler's and similar formulæ, .83  $I$  should be substituted for  $I$  in determining the strength of a tapered strut. The average cross-sectional area of a tapered strut approximating to the ideal is equal to .79 times the area of the central cross-section. Thus, by tapering a strut, the strength is reduced to 83 per cent., and the weight is reduced to 79 per cent., or a net saving of weight for strength of 5 per cent. It will thus be seen that this small saving would hardly appear to justify the additional labour involved in manufacturing a tapered strut.

(To be continued.)



#### Belgian Royal Air Voyagers

THE flight of the King and Queen of Belgium to Westphalia, to visit the Belgian Army of Occupation on April 24, was not altogether a pleasant one, as the Royal machines were caught in a hailstorm near the German frontier. The King's machine landed near Düren, but later continued in the direction of Bochum, which it reached at 2.30 p.m., while the Queen's machine, after landing outside Liège, where it took in petrol, reached Bochum at 1.30 p.m. The King and Queen later went on to Crefeld, where they were received by Gen. Lotz.

#### British Tour of Scandinavia

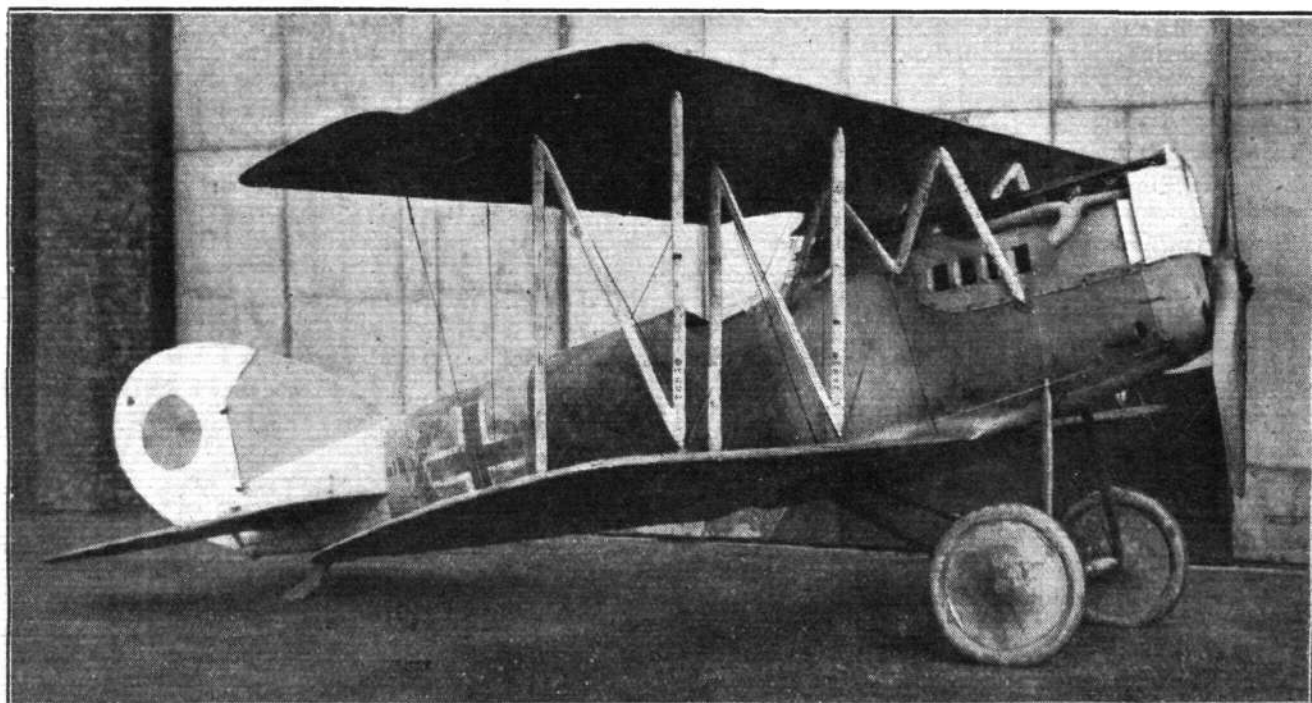
FROM Stockholm comes word that the Swedish Government has accorded permission for two British flying boats to traverse Sweden in pursuance of certain military experiments. Each machine will carry three officers and two mechanics, and during the passage through the country will execute certain manoeuvres and will exchange communications with the Swedish wireless stations. The route they intend to follow is:—England, Christiania, Gothenburg, Copenhagen, Stockholm, Copenhagen, England, and it is understood that they are to start from England in the first week in May.

#### The French Safety and Comfort Competition

THE provisional list of stages to be followed in the *Echo de Paris* tour of France competition, to take place in the early autumn, has now been mapped out. Machines will start from Paris, and will be obliged to stop at Tours, Nantes, La Rochelle, Bordeaux, Biarritz, Toulouse, Barcelona, Nîmes, Antibes, Turin, Frejus, Avignon, Lyons, Geneva, Colmar, Strasbourg, Metz, Brussels, London, and Lille, ending the journey at Paris. Two of these stages may be flown in one day. The total distance to be covered will be more than 2,790 miles, and the prizes will aggregate £12,000.

#### Long-Distance Flying in Scandinavia

FROM the results of the recent Inter-Scandinavian Flying Week, it would appear that the Norwegian pilots made the best showing. A Danish aviator covered the greatest distance by flying from Copenhagen to Slagelse, a distance of 850 kilometres. Two Norwegian aviators came next, each flying over 775 kilometres over land and water on unfamiliar routes. The Swedish aviators did not complete the course. Of six Danish aviators only two finished. All the Norwegian aviators finished their flights.



A PFALZ SCOUT.—This machine was one of the first to be surrendered under the Armistice terms.

# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

## Entrance Fee and Subscription for New Members

In accordance with the Resolution passed unanimously at the Annual General Meeting of the Royal Aero Club, on March 31, 1919, the Subscription for Members elected on or after May 31, 1919, will be £7 7s. per annum and the Entrance Fee £5 5s.

## Committee Meeting

A Meeting of The Committee was held on Tuesday, April 29, 1919, when there were present:—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Mr. Ernest C. Bucknall, Mr. G. B. Cockburn, Lieut.-Col. T. O'B. Hubbard, M.C., R.A.F., Lieut.-Col. F. K. McClean, Brig.-Gen. E. M. Maitland, D.S.O., Lieut.-Col. J. T. C. Moore-Brabazon, M.P., Lieut.-Col. Alec Ogilvie and Mr. H. E. Perrin, Secretary.

**Election of Members.**—The following New Members were elected:—

Sec. Lieut. Archibald Henry Allardyce, R.A.F.  
Lieut. John Maxwell Poole Baird, R.A.F.  
Major Vernon Sydney Brown, R.A.F.  
Major Reginald Hugh Carr, R.A.F.  
Capt. Geoffrey Ernest Clinton, R.A.F.  
Harry Ernest Dale.  
Capt. William Forster Dickson, D.S.O., R.A.F.  
Paymaster Lieut. Norman Stanley Douglass, R.N.R.  
Major Roger Martin Field, R.A.F.  
Lieut. Harold Fraser Game, R.A.F.  
John Granville Grenfell.  
Capt. Adolph Herbert Handman, R.A.F.  
Major Duncan Clive Mackenzie Hume, R.A.F.  
William Oscar Kennington.  
Johan Frederik Lebet.  
Capt. John Charles Liddle, R.A.F.  
Horace Gordon Lowe.  
Lieut. Francis Peabody Magoun, R.A.F.  
Capt. Thomas John Clement Martyn, R.A.F.  
Lieut.-Col. Derick Merens (Dutch Army).  
Major Thomas Baxter Milne, R.F.A.  
Capt. Samuel Eric Neal, R.A.F.  
Major Henry Andrew Robert Norton, R.A.F.  
Lieut. Cyril Eustace Prescott, R.A.F.  
John Herbert Redpath.  
Henry Herbert Reynolds.  
Major John Hunter Rutherford, R.A.F.  
Lieut. William George Sitwell, R.N.  
Capt. Reginald Noël Swann, R.A.F.  
Cyril Charles Teesdale Turner.  
Frank Ford Peregrine Walsh.  
Capt. Frederick James Watts, R.A.F.  
Lawrence Arthur Wingfield.

**Election of Stewards.**—The Stewards of the Club were re-elected as follows for the current year:—

The Earl of Lonsdale.  
Admiral The Hon. Sir Edward H. Seymour, P.C., G.C.B., O.M., G.C.V.O.  
Hon. Arthur Stanley, M.V.O., M.P.  
Sir Charles S. Henry, Bart, M.P.  
Lieut.-Gen. Sir David Henderson, K.C.B., D.S.O.  
Professor Sir John H. Biles, LL.D., D.Sc.

**Technical Committee.**—The following Technical Committee was appointed:—

Mr. Griffith Brewer.  
Lieut.-Col. D. Harries, R.A.F.  
Lieut.-Col. T. O'B. Hubbard, M.C., R.A.F.  
Lieut.-Col. F. K. McClean.  
Brig.-Gen. E. M. Maitland, D.S.O., R.A.F.  
Major R. H. Mayo.  
Lieut.-Col. Alec Ogilvie, R.A.F.  
Lieut.-Col. Mervyn O'Gorman, C.B.  
Lieut.-Col. T. H. Tizard, R.A.F.  
Mr. Howard Wright.

**Fédération Aéronautique Internationale.**—The report of the delegates (Lieut.-Col. Mervyn O'Gorman, C.B., Lieut.-Col. Alec Ogilvie, and Mr. H. E. Perrin) who attended the Conference of the Fédération Aéronautique Internationale in Paris on April 11 and 12, 1919, was received.

Letter from the Fédération Aéronautique Internationale was read convening a further Conference of the Fédération to be held in Paris on May 19, 1919, and the following delegates were appointed to represent the Club:—

Lieut.-Col. Mervyn O'Gorman, C.B.  
Lieut.-Col. J. T. C. Moore-Brabazon, M.P.  
Lieut.-Col. Alec Ogilvie.  
Mr. H. E. Perrin (Secretary).

The Secretary was instructed to forward several items for the Agenda, including the passing of World's Records for Aeronautical performances put up during the War.

**"Daily Mail" £10,000 Trans-Atlantic Flight.**—It was reported that the Proprietors of the State Express Cigarettes had offered an additional prize of 2,000 guineas to the winner of this Competition.

The following additional entry was reported:—

The Alliance Aeroplane Company, Ltd., 450 h.p. Napier Lion Engine. Pilot, Capt. W. R. Curtis, R.A.F.

## THE FLYING SERVICES FUND

(Registered under the War Charities Act, 1916)

Administered by the Royal Aero Club

For the benefit of Officers, Non-Commissioned Officers and Men of the ROYAL AIR FORCE who are incapacitated while on duty, and for the widows and dependants of those who are killed or die from injuries or illness contracted while on duty.

**Honorary Treasurer:**

The Right Hon. LORD KINNAIRD.

**Committee:**

Brig.-Gen. R. H. MORE, C.M.G. (Chairman).  
Mr. CHESTER FOX.  
Lieut.-Col. T. O'B. HUBBARD, M.C., R.A.F.  
Lieut.-Col. C. E. MAUDE, R.A.F.

**Secretary:**

H. E. PERRIN

**Bankers:**

Messrs. BARCLAYS BANK, LTD., 4, Pall Mall East,  
London, S.W. 1.

**Subscriptions**

Total subscriptions received to April 29, 1919.. 14,966 £ s. d.

**Offices: THE ROYAL AERO CLUB,  
3, CLIFFORD STREET, LONDON, W. 1.**

H. E. PERRIN, Secretary.

## WORLD'S AERONAUTICAL RECORDS

The Fédération Aéronautique Internationale is the sole authority for granting World's Records of flying performances, and the Royal Aero Club is the Official representative of the Fédération for the British Empire.

The Fédération, being International, it has not been possible for any World's Records to be ratified during the War, and consequently, any statements which have been published as to World's Records having been made during the War are not official, and are likely to mislead the public.

With the resumption of civilian flying, the Royal Aero Club will be in a position to supervise attempts on records under the Fédération Aéronautique Internationale and the Competition Rules of the Royal Aero Club.

Any person wishing to claim a World's Record for a flying performance carried out since 1914, is particularly urged to forward particulars to the Royal Aero Club for verification, and subsequent ratification by the Fédération Aéronautique Internationale.



# CIVIL AVIATION AND THE AIR ROUTES OF GREAT BRITAIN

THE Air Ministry makes the following announcement:—

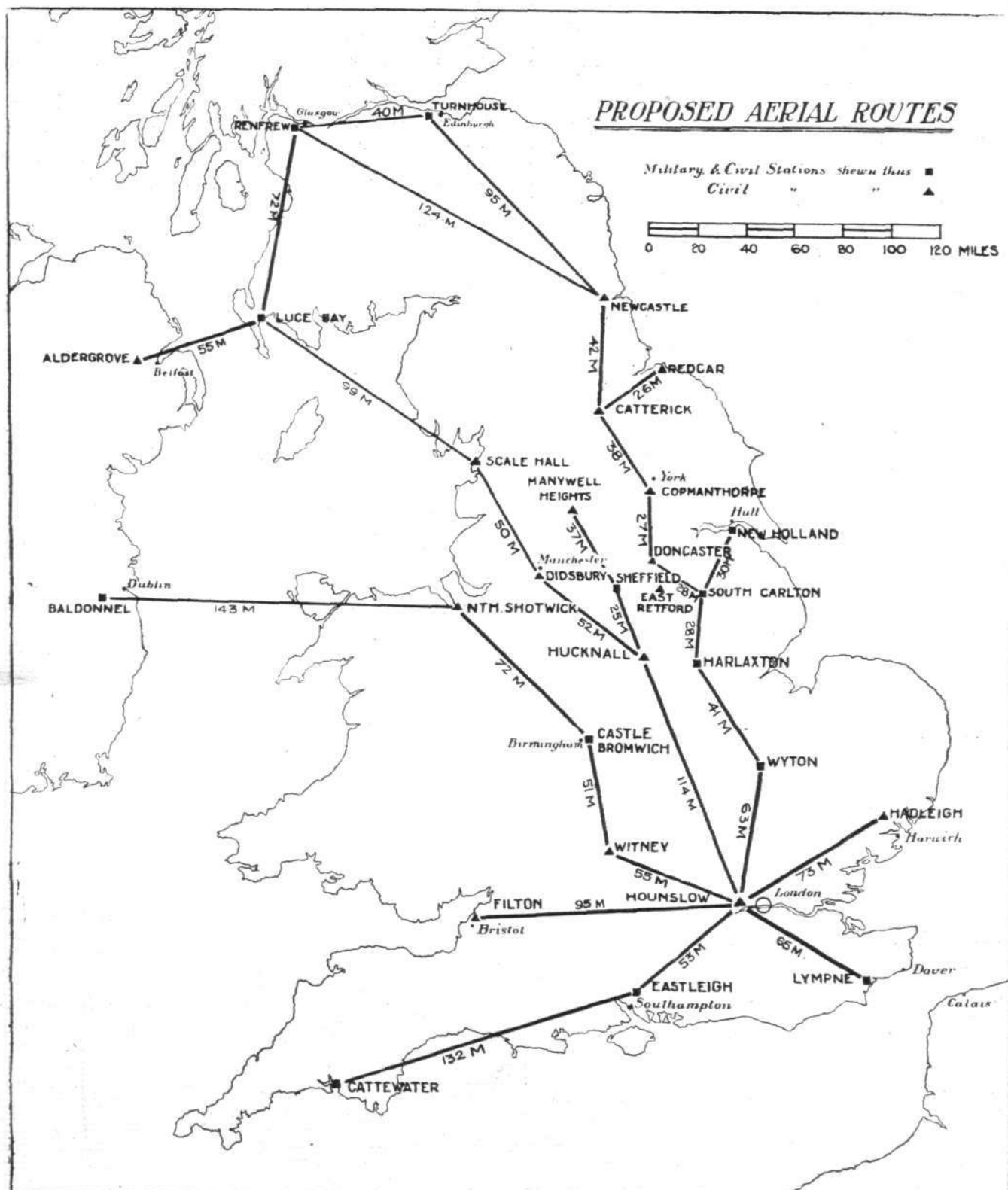
As was announced by the Under-Secretary of State for Air in the House of Commons on April 14, the ban on civil aviation is to be raised on May 1, and the Order containing the various regulations which will control it will be signed on that date. There must ensue a period during which regulations are being studied and applications are being made by firms and private individuals for the licensing of pilots and aerodromes, and the licensing and registration of aircraft.

To give all the assistance possible beforehand to those intending to take advantage of whatever facilities are offered by the Government, certain details of some of the aerial routes of Great Britain which it is proposed to declare open to civilian aviation, are now made public. These routes are shown on the attached map. It must, however, be emphasised that they are provisional, for practical experience

alone can show if all the air stations selected are rightly placed, and whether the proposed air track or route does not in some cases lie too far off certain large centres of population and industry. Uncertainty on these points is, for the moment, unavoidable. Selection and decision has been limited by existing conditions. Certain aerodromes are in being, and in order to start civil flying as soon as possible and also for the sake of economy, it is necessary to make use of what already exists. Whatever may eventually be the demand for additional or new aerodromes, it can be ascertained only after trial.

## Existing Facilities

On November 11, when the Armistice was signed, there were in Great Britain and Ireland 337 aerodromes and landing-grounds (a landing-ground being, for practical purposes,



the same as an aerodrome with less facilities and accommodation). Of these 116 have already been relinquished for purposes of cultivation, etc., while about 100 will be required for the time being by the Royal Air Force. There remain, therefore, about 120 aerodromes and landing-grounds which will ultimately be available for civil aviation. At very many of these there are extensive buildings, and it is possible that with the progress of civil aviation Town Councils, public bodies or important commercial firms interested in the subject, may be disposed to avail themselves of the opportunity of acquiring a "going concern" in an aerodrome equipped with ready-made accommodation.

Owing to the necessity for completing running contracts for material, for maintaining the power of remobilisation in case of necessity, and to the sudden cessation of the War, wastage of equipment overseas, the demand for storage accommodation in England at the moment is very great. This implies that at many of the aerodromes marked for ultimate disposal, the buildings will for some time be largely required for service machines, causing a deficiency in storage facilities which may prevent potential purchasers from taking over the aerodromes. The question of storage accommodation, however, is one of a temporary nature, and as conditions become more normal the situation will become easier owing to military equipment being relegated to military aerodromes. In the meantime a certain easement may be effected by the erection of Bessonneaux and temporary hangars.

## Choice of Routes

In spite of the storage and other difficulties, the Government has decided to open up certain trunk aerial routes at once. These routes have not been laid down arbitrarily—as history relates was done by a certain Tsar of Russia, in the case of a railway—by ruling a line on the map from place to place. They have been chosen with reference to the situation of existing aerodromes and military demands, and in their arrangement an attempt has been made not only to establish direct communication between London and Ireland, and London and the North, etc., but also to cater for some of the larger and more important centres of population which lie along the routes.

The routes at present suggested, together with the more important stations ("station" being the term used for an aerodrome or landing-place), are:—

### (1) London—Scotland

Hounslow.	Copmanthorpe.
Wyton.	Catterick.
Harlaxton.	Redcar.
South Carlton.	Newcastle.
New Holland.	Turnhouse.
Doncaster.	Renfrew.

### (2) London—Dublin

Hounslow.	North Shotwick.
Witney.	Baldonnell.
Castle Bromwich.	

### (3) London—Manchester—Belfast

Hounslow.	Didsbury.
Hucknall.	Scale Hall.
Sheffield.	Luce Bay.
Manywell Heights.	Aldergrove.

### (4) Continental Route

Hounslow.	Lympne.
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### (5) Dutch Route

Hounslow.	Hadleigh.
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### (6) London—Plymouth

Hounslow.	Cattewater.
Eastleigh.	

### (7) London—Bristol

Hounslow.	Filton.
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Once a particular route has been declared open, the pilot of an aeroplane making the journey will find petrol, some accommodation, and where possible mechanics to handle his machine at each of the air stations named, and the practical value of the intimation now given lies in the fact that on and after May 1, any individual who complies with the terms of the regulations is at liberty to fly along these civil air routes, and to make use of the stations and facilities afforded. It should be noted by all those interested that the Government cannot guarantee to assist aircraft which may land elsewhere than at a specified station, and a pilot

descending, either by design or owing to force of circumstances, at an aerodrome off the route must not expect to find either mechanics, accommodation or petrol or oil at his disposal.

## Opportunities for Private Enterprise

After deducting from the sum total those aerodromes which have been provisionally selected as stations along the proposed air routes, there will remain for disposal nearly 100, many of which are very well equipped. It is proposed to publish shortly a list of these showing the distance of each from the nearest railway station and postal town. There is, of course, no inherent necessity why these aerodromes, if not required for civil aviation, should not be used for other purposes, and it is possible that not aviation firms alone but other firms, such as engineering businesses, may desire to seize the opportunity of acquiring large buildings, valuable plant and open spaces of ground situated at important points throughout the country. Inquiries on this subject should be addressed to the Secretary, Air Ministry (C.G., C.A.).

## Appointed Aerodromes

The control of traffic passing to and from overseas cannot but prove a difficult problem, and it is one upon which the Air Ministry has worked in close touch with the Home Office and His Majesty's Board of Customs and Excise. It has been decided that the aerodromes which can alone be used for this traffic, called "appointed" aerodromes, shall for the present be limited to four in number, and with the exception of the London terminal aerodrome at Hounslow, be on the coast. They are as follows:—

*For Continental Traffic*—Lympne in Kent.

*For Dutch traffic via Harwich*—Hadleigh in Suffolk.

*For Scandinavian traffic via the Humber*—New Holland in Lincolnshire.

*For traffic direct to London*—Hounslow in Middlesex.

At these "appointed" aerodromes all outward and inward bound aircraft must touch, i.e., land for examination of goods and passengers. It has been suggested that these aerodromes would be better situated inland and not on the coast, the argument being that much of the time gained by aerial transit of goods would be lost if examination had to be carried out immediately on crossing the seaboard. But the difficulties of control if such a system were adopted, and the lack of certainty as to what particular channels trade will follow have led to the provisional placing of them on the coast. For the convenience of pilots flying direct from the Continent to London, one "appointed" aerodrome, has been placed at Hounslow, whence pilots can proceed after examination, direct to their destination.

It should be understood that the "appointed" aerodromes as at present selected, are by no means finally fixed as to situation, nor limited as to number. If sufficient trade and air traffic should grow up in any other direction, the question will be reconsidered, and "appointed" aerodromes will be established by the Air Ministry as necessary at other centres.

## Peace and War

Hitherto, much of the progress in aviation has been due to War and War conditions, and it follows that at first the majority of machines used in civil aviation will be either actual War models or War models adapted. But types more suitable for pleasure and commercial work are already beginning to make their appearance, and for them, as has been the case with the earlier War models, rigid care and supervision in regard to construction and airworthiness will have to be insisted upon for the safety of the travelling public, and also the public which does not travel.

For this duty, the Air Ministry will continue to be responsible. It will not in any way hinder development by imposing inspection on inventions or purely experimental machines, but it will insist on the inspection and certification for general airworthiness of any passenger machine plying for hire. Not only the machine, but the pilot who carries passengers, and the aerodrome where he lands will be liable to periodical inspection, and if they are not passed as fit, the licence is liable to be withdrawn.

Experience gained during the successful short spell of flying during Easter, when 972 people were carried, has been of assistance in drawing up the regulations. Any restrictions which have been imposed are for the safeguarding of the public, and it is believed that with the goodwill of firms and individuals concerned, the restrictions will be of benefit to the development of aviation as a whole.

## "Airships for Commercial Purposes"

In response to a demand for the "Notes on Airships for Commercial Purposes," issued by the Air Ministry a few

months ago, the Ministry has had it reprinted, and copies can be obtained from H.M. Stationery Office, at the price of 3d.



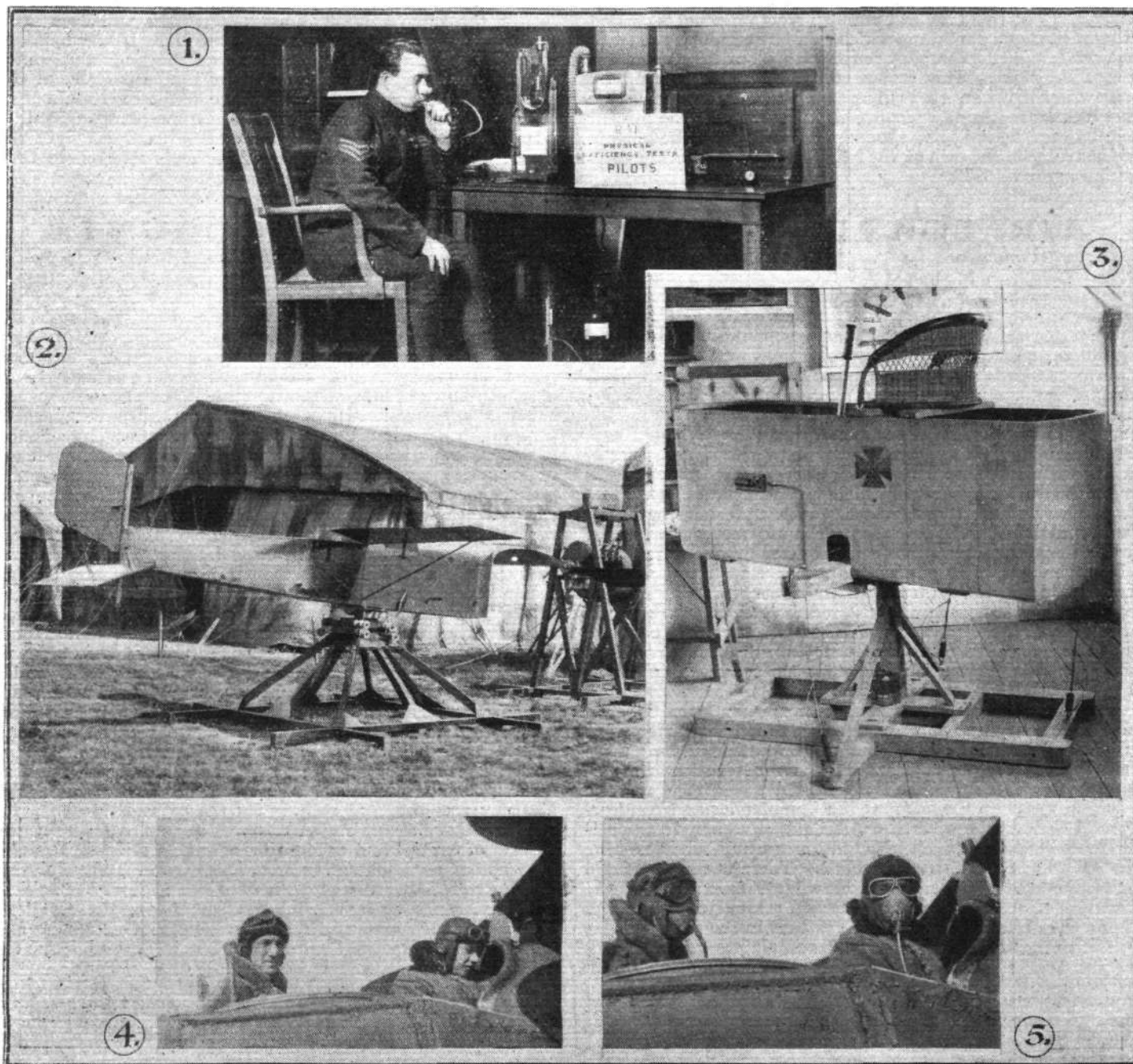
## AN INSTRUCTIVE DEMONSTRATION

IN connection with the Clinical Meetings of the British Medical Association, a highly interesting and instructive demonstration of the R.A.F. Medical Service Physical Efficiency Tests for Pilots was given on April 11, at the Royal Medical Society in Wimpole Street. In the absence of Col. Flack, who was to have conducted the demonstration, this office was very ably performed by Maj. T. S. Rippon, of the R.A.F. Medical Service.

Before commencing the demonstrations, Major Rippon pointed out that these tests are intended to give the Medical officer an indication as to whether or not the pilot is in need of an overhaul. They are not intended to supplant the clinician, but to give an indication of the need for his being called in. The aircraft pilot has a definite standard of work to carry out, and in order to do this work efficiently he must be up to a certain physical standard of fitness. As a result of a very great number of examinations of fit and unfit men,

certain facts have emerged, which facts it is the objects of the tests to ascertain.

The first test was the breath-holding test. It has been found that the length of time a man can hold his breath is an indication of his fitness for flying at altitudes, the diminution of oxygen in the lungs as the breath is held being similar to the way in which the oxygen becomes scarcer at altitudes. If the pilot cannot hold his breath for a certain specified time, he will be found unsuitable for flying at great altitudes. The time of holding the breath is also tested after a physical exercise, and the decrease in time during which the pilot can hold his breath should not exceed a certain amount. If it does, it is a sign of unfitness. A second test consists in measuring the expiratory force, by ascertaining how high a column of mercury the pilot can support by blowing. Test No. 3 is a mixture of the first and second tests, being a fatigue test with a U-tube manometer. One



THE R.A.F. MEDICAL SERVICE EFFICIENCY TESTS FOR PILOTS.—1. Shows a candidate undergoing "Fatigue Test" with the U-tube manometer. 2. Is an illustration of an aeroplane body, fitted with ailerons, rudder and elevators. This machine is placed in the slip-stream from an airscrew driven by the engine seen in the right-hand side of the picture. The candidate to be tested must maintain his balance by operating the controls. This apparatus was designed by Capt. de Havilland, and built by the Aircraft Manufacturing Co. 3. is a nacelle, centrally pivoted and operated by the candidate by a stick control. This machine was designed by Maj. Rippon and Lieut. Manuel in collaboration with Mr. F. Koolhoven, of the British Aerial Transport Co. 4 and 5 show a pilot and observer going for an altitude flight to test an oxygen apparatus. 5 shows them with the masks in place, ready for flight.

of the accompanying photographs, secured by a FLIGHT photographer during the demonstration, shows a candidate undergoing this test. The capacity of the lungs is also ascertained by making the pilot take as deep a breath as possible and then exhaling into an instrument similar to an ordinary gas meter, which is set at zero before the test, and which registers the number of cubic centimeters of air blown into the instrument by the pilot. As there is little or no resistance to blowing, pilots sometimes are able to show better capacity on this instrument than on some of the others in which blowing is opposed by a pressure that has to be overcome. In test No. 4 the pilot has to support a column of 40 mm. of mercury for as long a period as possible, and his pulse is taken during the test (at 5 sec. intervals). In a fit man the pulse should increase gradually during the test, while in the case of an unfit man the pulse may behave very erratically, as, for instance, by increasing rapidly and then dropping to or below normal. Also, in the case of the unfit man, the time of supporting the 40 mm. of mercury will naturally be shorter than that of the fit pilot. The test is repeated after a physical exercise, and if the pulse increases by more than 25 it is considered bad.

Another test, this time of the reflex reaction time, is carried out by means of a pendulum which at a given moment shows a small white light. The pilot must press a button the instant he sees the light. This action stops a length of string by means of which can be read off on a graduated scale the time, in hundredths of a second, elapsing between the instant the pilot sees the light and the moment of pressing the button. This instrument is shown on the left in Fig. 1 of the accompanying photograph.

## AIR BOARD AND AIR

A WHITE PAPER issued on Tuesday last gives a few details of the expenditure of the old Air Board and the Air Ministry (which succeeded the Air Board on January 3, 1918) during the year ended March 31, 1918.

From this account it appears that the total expenditure was £2,531,974 9s. 5d., which was expended under the following heads: Salaries, wages and allowances, £107,518 3s. 5d.; travelling expenses, £4,254 13s. 4d.; miscellaneous stores, £1,058 5s. 7d.; incidental expenses, £10,311 15s. 1d.; works and buildings, £2,408,831 12s.

The expenditure on works and buildings is due to the transfer to the Air Ministry on February 1, 1918, of a large programme of construction which was being carried out by the Ministry of Munitions, who had recently taken the works over from the War Office. Some charges for works for the Naval Air Service were also incurred after February 1.

From an attached paper it appears that there was an expenditure of £26,465 17s. 1d. in respect of land for the aerodrome at Shoreham, this representing the purchase money plus £608 2s. 4d. for costs. A second item was £35,324 15s. 3d. in respect of the Uxbridge Aerodrome on the Hillingdon estate, which, except for £50 costs, is shown as representing purchase money.

Attached to the account is some correspondence between the Air Ministry and the Treasury, in which the latter enter an emphatic protest against the granting of more favourable terms to contractors engaged on the construction of aerodromes.

In his report on the account the Comptroller and Auditor-General states that when the Air Council assumed responsibility for the construction of aerodromes a number of existing War Office contracts were cancelled. There were substituted for them revised terms, which were more favourable to the contractors, increasing their estimated remuneration in bulk from £98,000 to £164,000. The Treasury in the early months of 1918 appear to have received complaints from various sources as to alleged extravagances under the new method, and they asked for the observations of the Air Ministry on the system in force and its possible alternatives. They were not completely satisfied with the arguments put forward by the Ministry.

On July 9, 1918, the Treasury expressed their views to the Air Ministry in a letter, from which the following passage is taken:—

"Their Lordships regret that the Administrator of Works and Buildings should have taken the step (which was clearly outside his competence as an officer of the Ministry of Munitions) of cancelling and revising in a sense more favourable to contractors the already liberal contract terms on which aerodromes were being constructed for the War Office. As these contractors were receiving a percentage on their expenditure and incurring no risk, it is difficult to understand what public benefit could be derived from a change which increased their remuneration (by an amount

Major Rippon concluded his demonstration with the remark that the standard of fitness that will be insisted upon in the future is now under consideration, and will obviously depend upon the number of candidates, the nature of the work, and the needs of the Service.

Major Clements, R.A.M.C., then gave a demonstration of a test for judging distances. This is based on the phenomenon of stereoscopic vision, and is tested by means of three wires placed vertical, the two outer ones being fixed, while the central one is moved along towards and away from the candidate. A screen with a square opening is placed between the candidate and the wires, so that he is unable to see either top or bottom attachments of the wires, as this would enable him to judge accurately the position of the central wire. The candidate is asked to pull the cord operating the movable wire until he considers that the three wires are in a line. (The wires are at right angles to the pilot's line of vision).

A graduated scale enables the medical officer to read off the number of centimeters which the central wire is in front of or behind the two outer wires. A candidate with good judgment of distance will repeatedly come very near to getting the three wires in line, while others will be a good distance out, either too near or too far. If a candidate consistently places the central wire beyond the outer ones, or, conversely, if he repeatedly places it short of the outer wires, it has been found as the result of a number of tests that such candidates on landing an aeroplane either "land" it a few feet off the ground, or land it "into the ground," according to whether in the tests referred to they placed the wire too near or too far.

## MINISTRY ACCOUNTS

which they note is estimated at £66,000) without (so far as my Lords can see) securing in any particular an additional advantage to the State.

"They note that the ground alleged is that the contractors were not making sufficiently handsome profits, and had, therefore, 'lost interest' in their contracts, but that the Army Council state that this statement is entirely at variance with the information at their disposal.

"The complaints which their Lordships have received from many quarters as to the waste of money which is arising in connection with aerodrome contracts reinforce their view that the form of contract on the cost plus percentage system is open to serious objection. In your letter of the 28th ult. the Air Council represent that the alternative suggestions made by the Treasury are impracticable. My Lords understand, however, that they are used by the Admiralty in the almost equally difficult ship construction contracts, though not in works construction."

The Treasury requested the Contracts Committee, presided over by Lord Colwyn, to examine the question. The report of the Committee, which has been already presented to Parliament, recognised that in the majority of cases under the existing conditions lump sum contracts were not practicable, and they therefore recommended the basis of cost, plus fixed cost, with a possible bonus for expedition, and proposed the adoption of certain safeguards.

The Comptroller and Auditor-General also mentions that a test examination recently applied by his officers to the Air Ministry accounts and records for the expenditure on aerodrome construction brought to his notice defects in the system of control and accounting of such a serious character that he had reported the circumstances to the Treasury. He has suggested that the whole matter should form the subject of special enquiry by an independent body, the result of whose investigations might, if necessary, be brought before the Public Accounts Committee at a later period of the session.

It is also pointed out by the Comptroller and Auditor-General that the action of the Air Ministry and the Admiralty, acting on their own initiative, extended the award of 12½ per cent. bonus to work done in Ireland, though that was not the intention of the Committee of Production. The Treasury stated that this action had resulted in very serious financial consequences, the Air Ministry having extensive works in progress in Ireland at the time.

On the cessation of hostilities it appears that measures were taken to stop the work on the construction of aerodromes as rapidly as possible. By the end of March last work had ceased at 71 sites without completion of the original schemes.

On November 11 the civilian clerical staff at headquarters numbered 2,549, and on January 31 last it was 2,768. It appears, however, that the military staff had been appreciably reduced.



## "CIVIL AVIATION"

MAJ.-GEN. SIR F. H. SYKES, Controller-General of Civil Aviation, presided on April 25 at a luncheon given by the Air Ministry at the Criterion Restaurant, and gave some further indication of the Ministry's policy regarding civil aviation.

Gen. Sykes said he knew they would agree with him in regarding the occasion as one fraught with great possibilities for the future of the Empire. The occasion was in its potentialities comparable with the first opening of railways in this country. A new venture affecting all the activities of the body politic was being launched with Government backing and help. In *Military Aviation* (which until recently was his task) he thought they might say without offence to any other people that circumstances had permitted us to lead the world. Britain's "War Effort in the Air" (which is printed on pp. 578-582), gave some idea of what was meant. It was for us to see that we did not during Peace lose the advantage gained during War, and that we also held the same position in civil aviation.

At the outset, perhaps, a word in regard to the absolute necessity for definite regulations might not be amiss. To be first in the field implied speed, but it did not mean hurry. One could not afford to make mistakes in the air as on the ground or even as at sea, and a series of accidents which might be caused by lack of forethought and precaution might well cause a setback to the whole art and industry. Before traffic in the air could become general, laws had to be established for its guidance both for the security of those engaged in it and to try to help to protect those people who unwillingly, of course, had to remain below.

Flying was an international affair, and the first step had been to frame an international code. As the result of conferences in Paris a draft Convention has been drawn up, and it was on it that our home regulations for civil flying would be based. They did not apply to British or foreign military aircraft.

The first point that naturally occurred was who might fly? The issue of the regulations would not mean that any civilian who so wished could at once take the air and fly to places overseas. That must wait for the ratification of the international agreement to put it on a permanent basis.

Before being put to proof as to their technical capability those wishing to be pilots, navigators or engineers in the air, must pass a medical test. Physical, mental and temperamental suitability were obviously very important, and had been made the subject of special medical research.

Any person wishing to fly aircraft carrying either passengers or goods for hire must obtain a certificate to the effect that he is properly qualified to do so, and a licence.

Turning from personnel to material every aircraft must be registered and would be assigned a registration and nationality mark. Before this, however, each particular type of aircraft would have to be officially inspected for design, material, construction and actual performance in the air. Machines would be certified for a definite load, for in the air no overloading or strap-hanging could be allowed. Each passenger or goods machine will carry log-books.

All passenger aircraft would be periodically inspected, overhauled and certified as airworthy and none would be allowed to start on any journey unless it had first been inspected on that same day by a competent person other than the pilot.

As regards departure and arrival, passenger-carrying aircraft would be allowed to leave the ground or land (except under stress) only at certain aerodromes, which had been approved and licensed as being suitable. A list of those already selected is given elsewhere.

Rules had been agreed to in Paris for the control of aerodrome traffic, and would be attached to the regulations, and once in the air a definite international rule of the road must be adhered to. Every possible precaution must be taken against collision. Instant and instinctive decision were essential, and the rules must therefore be perfectly clear and simple.

A small but important regulation forbids anything except ballast, that is to say, water or fine sand, to be dropped from aircraft. It must be remembered that even a small and comparatively light object casually thrown overboard by

some thoughtless but well-meaning person might cause grievous damage below.

So far as national secrecy was concerned, there are, of course, certain specified prohibited areas of a nature which could readily be imagined, over or by which no aircraft may fly.

An obvious point which had not been lost sight of is the danger of certain undesirable gentlemen from overseas being literally dropped from the clouds in this country and the police and other authorities knowing nothing of their advent. The provisions of the Aliens Restrictions Order or the Defence of the Realm Regulations were applicable to persons arriving in this country by air equally with those arriving by sea, except that the place of "approved ports" was taken by that of "appointed aerodromes."

The danger of aerial smuggling, once aviation becomes free, was a real one, and it was largely with this in view that there would be at present only four of these "appointed aerodromes" which might be used by aircraft arriving from or departing for abroad. If, however, they found that commercial traffic developed, for instance, from Manchester or Liverpool to France, or, say, Italy, or even further afield, they could always extend the number by arrangement with the Customs.

In regard to the recent foretaste of civil flying provided for in flips or short pleasure trips during Easter, he gathered that there has been some dissatisfaction as to the facilities granted by the Air Ministry. It has even been said that the facilities were, in fact, nothing but restrictions. To emphasise how necessary some of the restrictions were, he mentioned a few of the causes which might have given rise to serious accidents during Easter week if no limitations had been imposed and no precautions taken. As it was, the five days' flying passed without accident; 972 people were carried safely. This, he thought, reflected credit not only on the firms and pilots concerned, but also on the Department which he had the honour to control, and which, acting on "safety first" has insisted on enforcing, despite some opposition, the regulations which were imposed. So soon as the announcement that civilian flying was permitted from April 17 to 22 was made in the House of Commons by Gen. Seely on April 14, applications were sent in to the Air Ministry from all parts of the country for licensing of proposed sites for aerodromes, machines and pilots. The majority of the proposed sites had up to then never been used as aerodromes, but in every case officers were ordered by telegram to proceed to inspect them, and many of the places were found to be absolutely unsuitable. Furthermore, some of the pilots who applied for licences were found on investigation to have retired from the R.A.F. as "permanently unfit for pilot or observer." Had permission been granted to these men to take passengers into the air, accidents might have occurred with most disastrous results.

Again, in some cases licences were asked for machines which were either obsolete or had not passed their experimental stage.

Aviation was still a new science. They had learned most of that which they already knew by bitter and tragic experience. Let them not flatter themselves that an easy path lies ahead, and that a benign chance would lead them inevitably to their goal. Future success will only be theirs if they deserved it as the result of initiative—honest workmanship, perseverance and skill.

As the Secretary of State has pointed out, the task of the Department of Civil Aviation would be to help in every way by the provision and dissemination of intelligence, and information and expert opinion. If, as they were doing, and he was sure they would do, they displayed real team work in its best sense, he had no doubt of the continued success of British aviation.

Among those present were:—Lord Londonderry; Brig.-Gen. R. M. Groves, Deputy-Chief of the Air Staff; Mr. H. W. W. McAnally, Assistant Secretary to the Air Ministry; Maj.-Gen. Ellington, Director-General of Supply and Research; Maj.-Gen. E. D. Swinton, Controller of Information, Air Ministry; Mr. C. V. Allen, secretary, and Mr. H. Fulton, treasurer of the Society of British Aircraft Constructors; Brig.-Gen. Sir Capel Holden, vice-chairman, and Lieut.-Comdr. H. E. Perrin, secretary of the Royal Aero Club.

### The French Air Service

FIGURES published in Paris last week show that the French Air Service, which in January, 1916, numbered 1,070 officers and 28,444 men, had grown to 2,674 officers and 59,275 men in January, 1918.

### Over the Alps

LEAVING Lyons in a gale, three Italian military pilots, in a 600 h.p. aeroplane, on April 23 flew across the Alps and landed safely at Cambiano, near Turin, the trip having taken 2½ hours. On the way they encountered a heavy snowstorm.

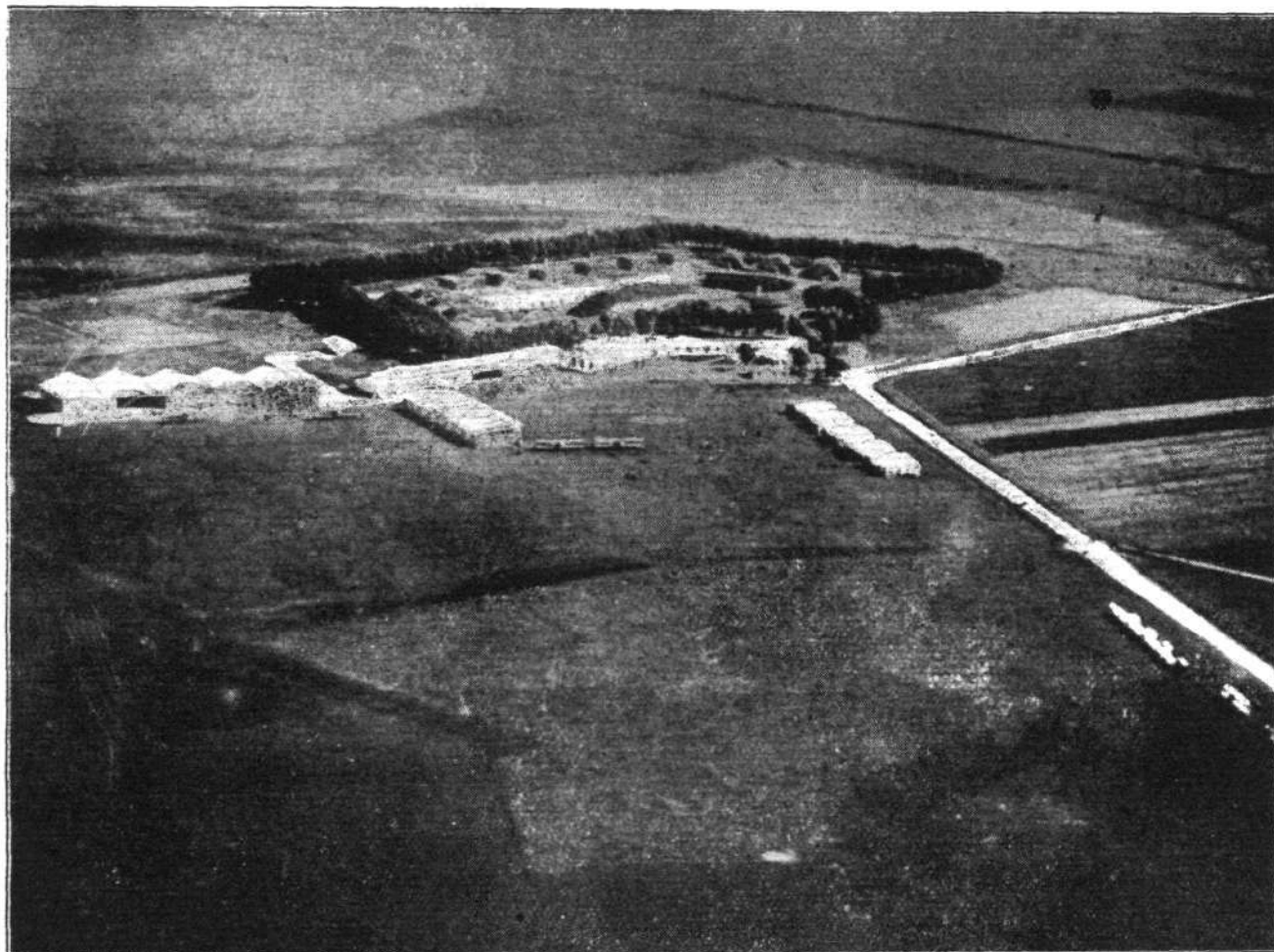
# THE ROTARY CLUB AND CIVIL AVIATION

At the St. George's Day Dinner of the Rotary Club of London, at the Holborn Restaurant, aeronautics was the subject down for discussion. Mr. G. E. Pike, the President, occupied the chair.

Lieut.-Col. W. A. Bristow, R.A.F., in an address said the present was a critical time in the history of aeronautics, probably the most critical which it would ever have to face. It would be no easy matter to harness for commercial purposes the whole of the great organisations which had been built up during the War, and no doubt before the industry was finally established on a peace basis, there might be very considerable changes. Some people were inclined to be pessimistic with regard to the future, but he thought this was a great mistake.

During the War, British engineering skill and enterprise overcame far more difficulties in designing and equipping the countless War machines than were likely to be encoun-

Col. Bristow then paid a tribute to that small band of aeronautical pioneers who, working without encouragement, and without thought of reward, did so much to introduce the art of flying into this country. In a rapid historical survey of the work of Cayley, Hensen, Stringfellow, Pilcher and Maxim, Col. Bristow recalled that on March 24, 1843, Mr. Roebuck made an application to Parliament for an Act of Incorporation for the Aerial Steam Transit Co., to be formed for conveying letters, goods and passengers from place to place through the air. Each subscriber of £100 was to receive £500 about a year later, and even more generous return than is offered to-day. Nothing happened, however, and the matter was allowed to lapse for twenty years. After mentioning the outstanding features of the experiments and trials of the pioneers mentioned above, Col. Bristow said that this brought them up to the twentieth century, although it was not possible in the time at his disposal



Illustrating Lieut.-Col. Bristow's address: The big aerodrome at Rome which will form one of the main harbours on the route to the East.

tered in the establishment of successful commercial aircraft, so that from a practical point of view the difficulties might be said to be non-existent, and within a very short time, flights of unheard-of range and duration would take place all over the globe. All the arguments that were brought forward against the use of aircraft as a means of transport had been urged in the past with regard to each new means of transport as it was introduced, so that history was on the side of those who firmly believed, as he did, that the difficulties which, at present, may seem rather serious would in a short time be overcome. It must not be forgotten also, that the inauguration of aerial transport had been accomplished in circumstances infinitely more advantageous than attended the commencement of any other form of service. The Great War caused the expenditure of a stupendous amount of money on the development of aircraft, an amount which would not have been equalled during many years of peace-time development. No other industry had ever been started under such favourable conditions, and as aerial transport could and would completely revolutionise many phases of life, there was not the slightest doubt in his mind that the future was completely assured.

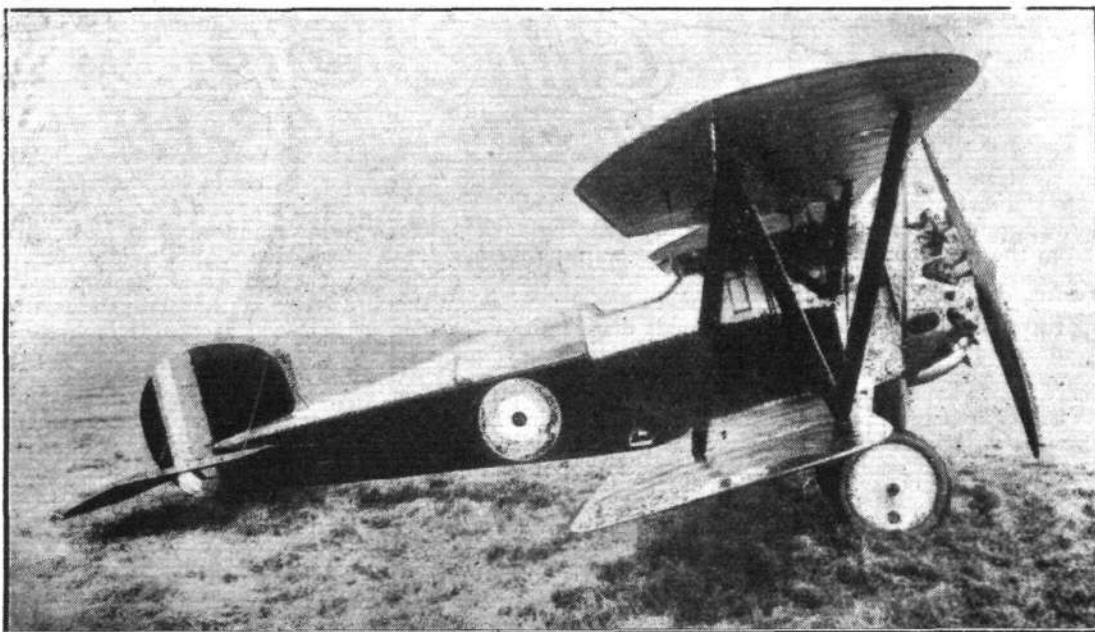
to do justice to all the workers of the nineteenth century, but it was the genius and courage of our countrymen during this time which very largely paved the way for the wonderful progress of the last twenty years.

Then followed a series of over 50 highly interesting slides, lent by Col. Ogilvie and other friends of the speaker. Of these we are able, by the courtesy of Col. Bristow, to reproduce one or two of more immediate interest at the present moment.

Brig.-Gen. Brooke-Popham, D.S.O., Director of Aeronautical Research, said that no disappointment should be felt amongst the public if civil aviation did not begin with a tremendous bound. It would probably be a good many months, or even years, before they saw civil machines, designed purely for civil purposes, actually flying and in use. It was not realised in this country, he said, the debt the nation owed to the pioneer constructors. But there was still a vast field open for research in all branches of aeronautical science. Research work in aeronautics could not be looked upon altogether as a whole by itself. It was the intention of the Air Ministry that aeronautical research should be closely connected with other branches of research



A Bristol fighting scout fitted with a 350 h.p. A.B.C. air-cooled engine designed by Mr. Bradshaw. (Illustrating Lieut.-Col. Bristow's address.)



in this country. If they tried to develop research entirely from an aeronautical point of view, they would not be able to draw on all the resources available, all the various laboratories available in London, and the various universities. He hoped a scheme would shortly be in operation whereby they would be able to advance aeronautical research hand in hand with research in other branches of science and industry.

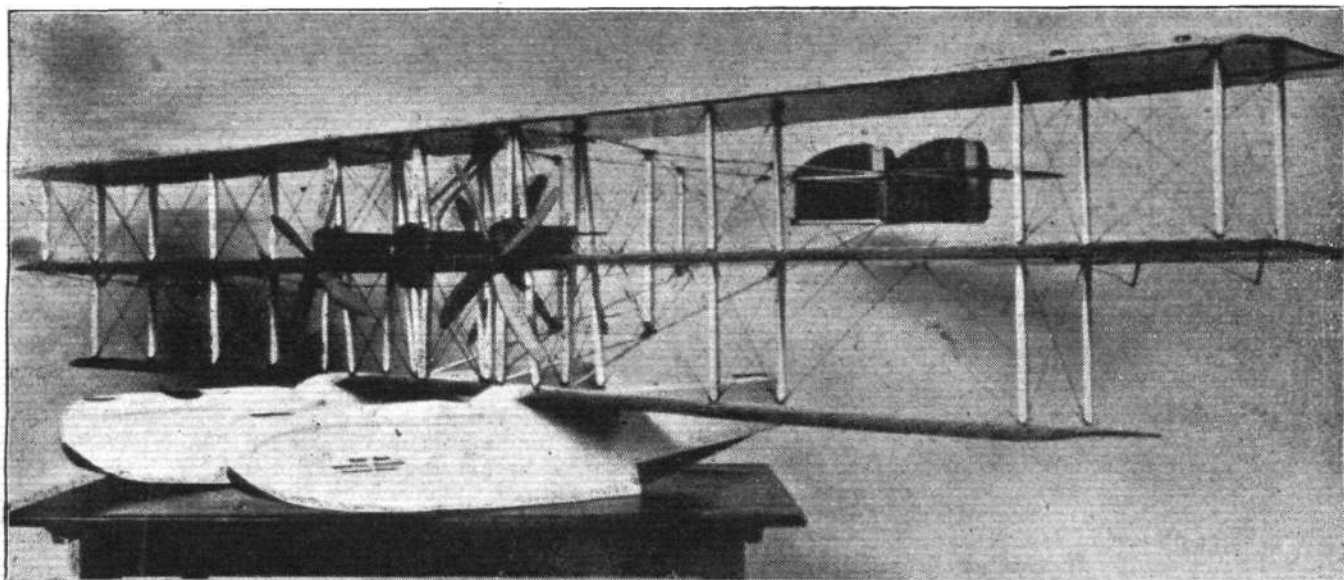
He hoped the research department, of which he had lately been appointed the head, would prove to some extent the successors of the pioneers who had laid the foundations of aeronautical science in this country.

Col. Alec Ogilvie said that if we could maintain the same progress in the next five years as in the past five years, large commercial firms could hope to conduct most of their business by its means. But that could hardly be hoped for. The cost had been phenomenal, and that could hardly be expected to continue. We had to get back to a peace expenditure basis. But, though some little time might be needed for the work, aviation would certainly take a permanent position in the business life of the community, altogether apart from its war purposes. One of the obstacles to the use of aircraft for the general community was the fact that it was necessary for aeroplanes to run up a gradient, that gradient, which was once one in four, was now one in eight, and he thought within 10 years it would be 1 in 16. The flatter the gradient, the cheaper aerial transport would be. Dura-

bility of machines was an important matter. This must be achieved for commercial success. Durability in military machines was a very different matter, as this was not of so much consequence, except so far as instructional machines were concerned, owing to rapid progress, types becoming obsolete and the necessity for being up-to-date. Employment of metal in construction would solve this difficulty for commerce, giving a life of three or four years in the most variable climate. Fog was still a serious difficulty, and the only one that he thought might prove to be insurmountable; it was not possible to ensure a successful landing in a fog.

Mr. J. Bain Taylor asked whether an aerial post, readily accessible to business men, could not be established here. He had, during a recent visit to the United States, noticed that, for instance, at the Belmont Hotel, New York, an aerial post was an ordinary feature of the place.

Lieut.-Col. Bristow, in reply, said the circumstances in this country differed from those of the United States. When the time taken in collection and delivery formed a large proportion of the total time of transmission, the advantage of using the aeroplane was diminished. The establishment of a great scheme of postal service with the Continent was, however, under consideration. There would be a very complete postal service to France, Italy, Egypt, and even South Africa. It would be possible by this service to send samples and small packages.



A model of a flying-boat of the future by Messrs. Short Bros. The completed machine will have two separate hulls underneath the wings. Each hull will accommodate a large number of passengers, and will be fitted up very much on the lines of a small passenger steamer. It will be seen that the machine is designed with the rudders and elevators almost on a level with the top planes in order to avoid any damage from the waves. It will be driven by three engines of about 1,800 h.p. (Illustrating Lieut.-Col. Bristow's address.)

# AIRISMS

## FROM THE FOUR WINDS

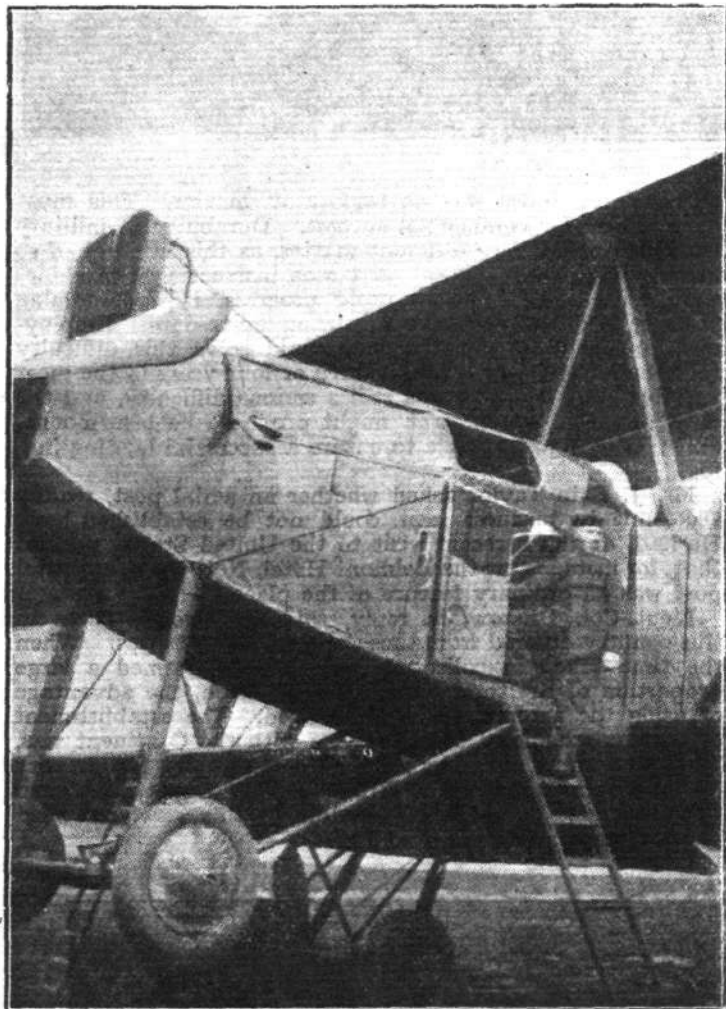
IN the name of the last of the three Graces, comes "Air Pie," a well-produced publication which you can buy for a crown, and the crust of which is simply bursting with goodies from the generous hands of well-known scribes and painters. There is a long list at the beginning, setting forth the distinguished folk who have *not* contributed for it; whether this is to pillory or praise them one cannot guess! But the men and women whose work actually appears have done well enough.

THERE is a cryptic poem, "The Ballad of Saint Barbara," by Mr. G. K. Chesterton—"which is really very pretty, but I don't know what it means," as another balladmonger

forbids comment. Artemas is droll for a page in a Biblical style, and Mr. Harold Begbie is solemn for two pages in the same manner. But Mr. Begbie is the funnier. Stay—I had forgotten Captain Bewsher. Any scribe could guess why the offerings of Messrs. Zangwill and Pett Ridge come to appear in a work produced for charity, and he who reads them had need of that virtue.

THE "Air Mechanic's Dream After Mince Pies," by A. Hayes, R.A.F., shows a fine sense of the ludicrous, and Captain Frankau has sent one of his habitual ringing rhymes. Mr. Thomas Hardy dominates the English language through the four quatrains of "Jezreel," and Mr. Robert Hichens writes a few lines on how he did not accept his first invitation to fly. The "Garden of Allah" was better. A hint is visible of Mr. Galsworthy's consummate artistry in the half-page which he has donated, and the "Summer" of Mr. Frank Brangwyn is instinct with studied form and riotous colour. Flight Cadet McMichael's drawings are as good as ever, and Mr. C. W. R. Nevinson has restrained his cubist brush long enough to produce some slightly pictures. Mr. de Vere Stacpoole's essay in *petto* is jolly, and Mrs. Maurice Hewlett has contributed a few reminiscences.

THE book, which is an annual on behalf of the R.A.F., edited by Pte. W. Kean Seymour and Cadet Cecil Palmer, R.A.F., is a bright production, speckled with excellent photographs, and distinctly better than most



**A ZEPPELIN GIANT.**—The photograph shows how the fuselage is entered through a door in the side.

sang; certainly, it is finely and felicitously worded, as we might expect. There is a vivid and gory extract from Mr. H. G. Wells' "Joan and Peter," which merely goes to show that the folk who best describe aeronautics are those who stay on the nice flat earth, and refuse to be lured aloft. Mr. L. J. McQuilland, who is the word-juggler of the *Daily Express*, shows us the interior of the Café Royal, very acceptable to a scribe who is to be seen daily, one of a haggard line outside the National Kitchen.

MR. JEFFEREY FARNOL, forsaking carnivorous blacksmiths, fair ladies in distress, and discreetly-chosen excerpts from Brantôme (where discretion is advisable, as you'll grant if you have read that amiable Gaul)—where were we?—Mr. Farnol has given us a scrap-story that is so full of X's, Y's and Z's, that it is reminiscent rather of Euclid than the high romance through which he is wont to thread so fealty.

W. B. MAXWELL contributes an adhesive little piece of sentimentality, atoned for by the wildly-funny drawings by Raven Hill and Heath Robinson, which follow it. Miss Marie Corelli insisted on inserting "A Reverie in the Air"; chivalry



**Miss Sylvia Borden, who has been demonstrating the ease of leaving an aeroplane by means of a "Guardian Angel" parachute, in "jumping-off" rig, just before going up at Cricklewood in a Handley Page machine for making a descent**

of the mixed grills of this nature. The purchaser will have more than the mere feeling of virtue in exchange for his money.

WE quote from the *Daily Herald* "Interview with a Demobbed Airman":—

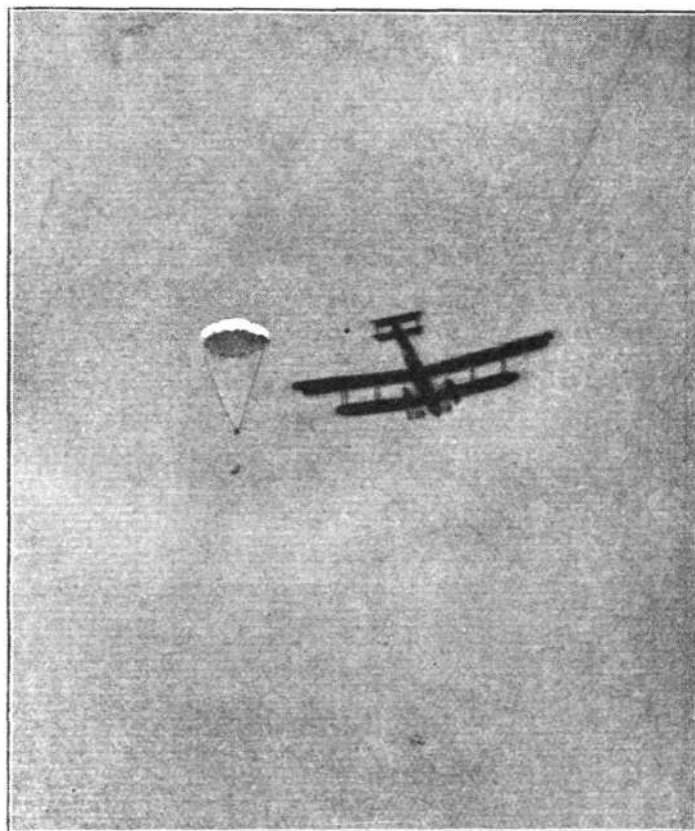
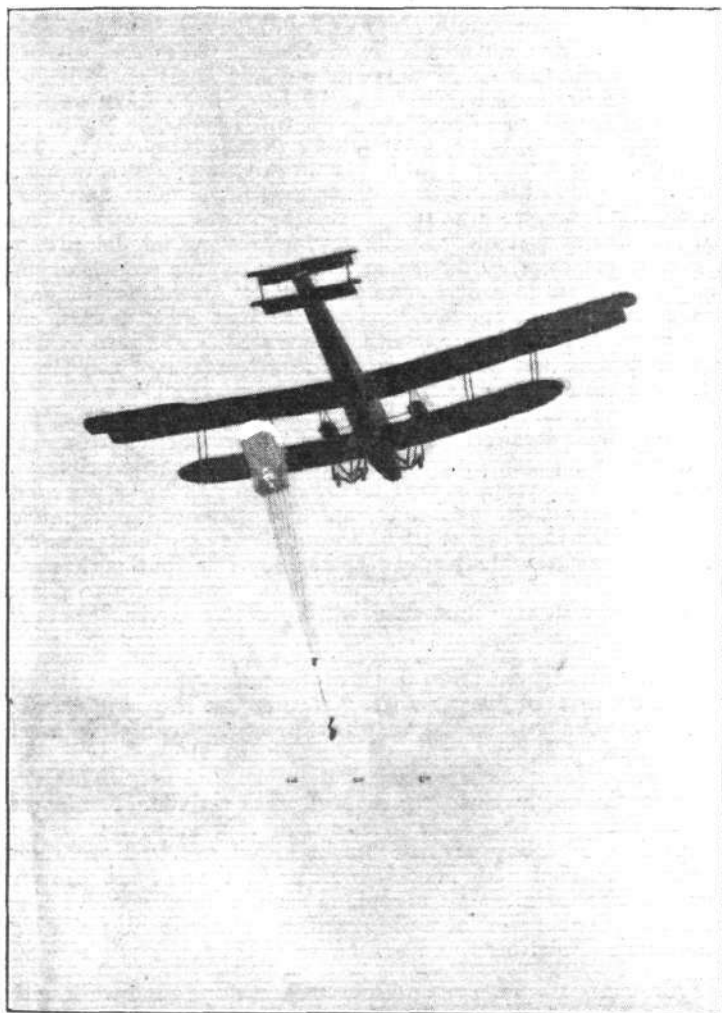
"A thousand feet falling, the subtil wine infusing my brain to an excess of intoxication. . . . I lash her in mad



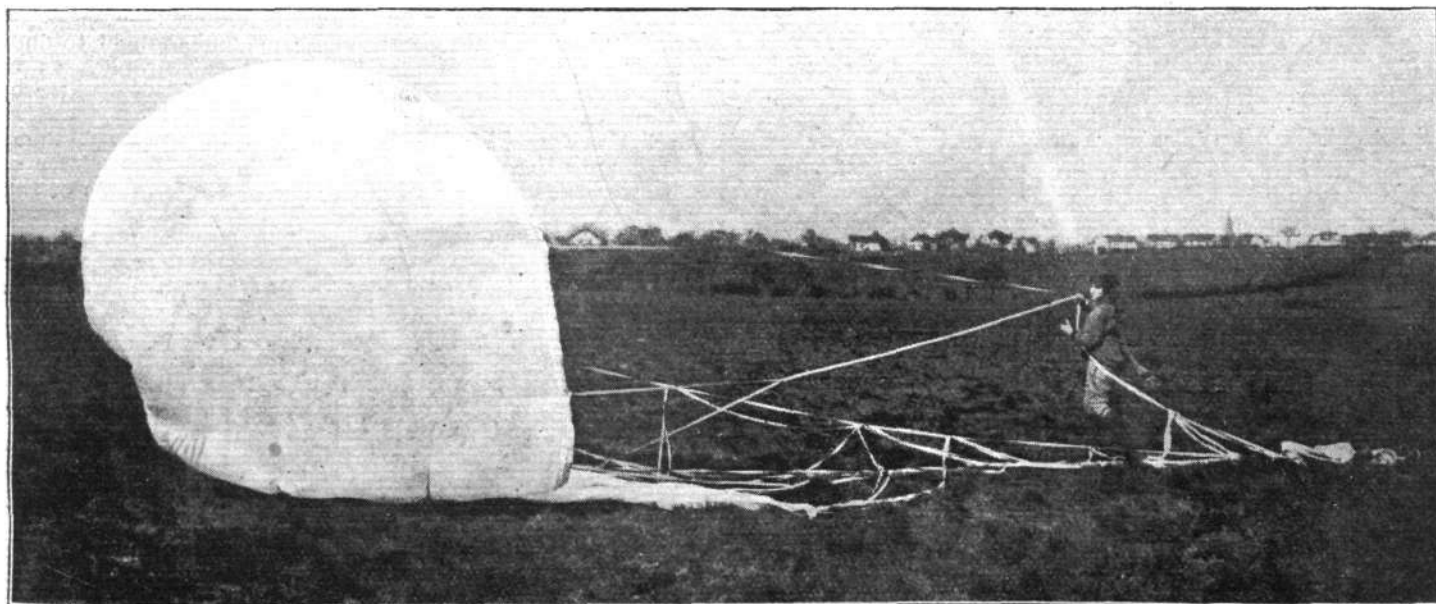
fury—she leaps and writhes as a living horse to the bloody spur, we race across the sky in a series of cartwheels, rolls, and Immelmans. I put her nose into a spin—the earth rotates round and round my head as if swung on some gigantic cable . . . the sudden jolt of her undercarriage hitting the ground . . . oh, the cruel, abrupt disillusionment of it all! I look up into the sky, and a lump comes into my throat at the thought of nevermore treading those pellucid pathways . . .

Something about the soulful diction of the above makes us think that the Fashion Editress has strayed off her rightful page!

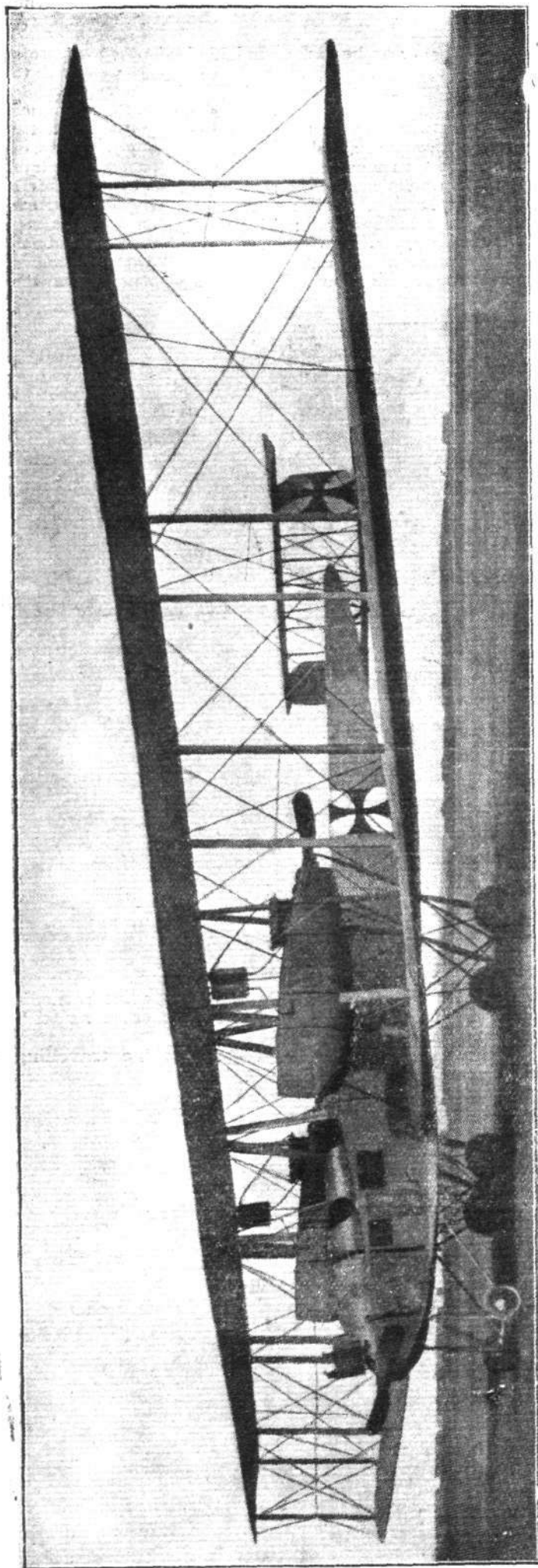
Others may swear by Belloc and kindred prognosticators of the more expensive reviews, but for our part we cleave to Old Moore. At twopence (war price) he is wonderful value, entertaining as a revue, and informative as the reference wing of the British Museum. Advertising matter is deftly blended with prophecy, and to judge from the former most of the seer's apostles must be afflicted with distressing minor ailments. In deference to the susceptibilities of our readers we can only indicate a few: That entrancing one, "How Drunkards are being Saved; These Eighteen Pictures tell their own Story, a Child could understand them; send for Book 'Confessions of an Alcohol Slave,' with ingenious and revealing letters from former slaves who now shun the



**DESCENDING BY PARACHUTE FROM AN AEROPLANE.**—Miss Sylvia Borden is seen on the left immediately after leaving the Handley Page at 1,000 ft. Note at this first stage of the opening of the "Guardian Angel" parachute, the position, head downwards, of the parachutist. On the right the next stage is seen with the parachute fully inflated and the Handley Page machine travelling away in the near distance.



Miss Sylvia Borden, immediately after alighting on *terra firma* in the "Guardian Angel" parachute at Cricklewood, takes the apparatus in hand for gathering together prior to her next demonstration.



A GERMAN (ZEPPELIN) GIANT AEROPLANE.—Note the tractor screw in the nose of the fuselage.

cup; the picture of a ferocious gentleman, once bald, but now a very Absalom; the offer of a free gold watch to those sagacious ones who can count a few squares correctly; and also this insidious offer, "If you have a husband, brother or son, who is afflicted with the smoker's curse, you can cure him SECRETLY." This is emphatically a book to be hidden from one's wife!

We note an almost legal caution of the forecasts, and although the excellent Moore is prodigal with insurrections, riot and bloodshed (he predicts an extremely lively year for Portugal in 1919), we can only find one phrase in which he may be said to commit himself, that which concerns this month: "The German people now rise in disordered conflict against their rulers. Who comes up from the Sea shall find uncertain footing on the sands." Those who have hunted the nimble prawn in his fastnesses will admit the justice of this last remark, but we cannot see that it is relevant. The "hieroglyphic" for January is interesting; it shows an extremely obese capitalist, complete with fur collar as fitted, ordering a brawny labouring man to go back to work. This is An Acute Labour Problem. The prudent magician confines himself largely to generalities: "In this month explosions and fires do hurt to the young." "Aerial disasters are much in the public eye." Ah! we had missed this, for May: "The Government will be assailed, and there will be great destruction of property. The aftermath of the Great War is now being reaped in many quarters."

SURELY an excusable crime, that of the nineteen-year-old lad for whom the sight of an unoccupied machine ready for flight was too much, so that he hopped in and had a flip aloft for ten minutes. His fine, which works out at a pound a minute, makes one think it would have been better worth his while to have had a two-guinea joy-ride, but perhaps it was worth it to him. There will be a good many to share his feelings shortly, but they will be better advised to take it out in motor-cycling.

TRUST the bookmakers to be up-to-date. The latest slogan of these friends of mankind is "You comes in yer moke an' barrer; you goes in yer 'Andley Page!" Really, we must have a bob on.

THE "flying matinée" (new style) has arrived. Audiences expressing an insatiable desire for the ministrations of Mr. George Robey or Miss Marie Lloyd are to have their desires gratified with magic-carpet speed; the Moss Empire circuit has installed an aeroplane service to this end. The Po-Tate-O-plane of a well-known comedian will probably be requisitioned for the fleet.

A RECENTLY-RETURNED officer, who has done good work with the Balloon Section of the R.A.F. in Mesopotamia, gives an amusing account of his experiences with native Arab labour. The tawny head-men took to the work with exemplary quickness, but could not be compelled to wear the regulation shorts, as they were "knee-shy," and felt them beneath their dignity.

*À propos* the very regrettable accident to the military H.P. machine last week, Mr. Jack Imber writes from 162, Worple Road, Wimbledon, as follows:—

"As one who has given much time and thought to finding a means of preventing fire in such catastrophes as that reported yesterday, I feel the full force of the disaster very keenly.

"The loss of life is lamentable, and immeasurable damage is done to the progress of aeronautics, and the rapidity with which the public will accept flying as a safe means of transport.

"To sit in an aeroplane in flight knowing that the tank containing highly-inflammable petrol is not protected to the fullest advantage, and that fire in the air means certain death, is taking an unnecessary risk.

"When the armistice was signed, there were in course of construction petrol tanks for aeroplanes which would resist fire, even under war conditions, where different types of bullets (tracer, incendiary, etc., etc.) are shot through the tank; and the Air Ministry were fitting these tanks as quickly as they could be made.

"Tests carried out to prove the value of the tanks in preventing fire in crashing, heavy landing, or faulty construction, were very successful, and tanks full of petrol dropped from great heights did not leak.

"I write you in the hope that you will publish my letter and endeavour to reassure the public that these regrettable fires can be prevented, and that the Self-Sealing Tank, as



approved by the Air Ministry, when fitted to aeroplanes gives safety."

Now, what about those Self-Sealing Tanks for the future?

MANY people who talk airily of the possibilities of flying in South America should make a point of looking in at the Polytechnic Cinema any afternoon at 2.45 during this or next week to see the wonderful films which are being shown by Mr. G. M. Dyott (late Commander, R.N.A.S.). During the exploration trip in Peru and the regions of the Upper Amazon, from which he has recently returned, Mr. Dyott had many exciting adventures—it is not too much to call some of them hair-breadth escapes—and he has brought back a splendid series of pictures. From his previous experience of flying in Central American countries, Mr. Dyott is

in an exceptionally good position to discuss the possibilities of aerial transport in such parts of the world, but it is evident from the pictures that the contour and the nature of the country put very great difficulties in the way of such developments. Nevertheless, Mr. Dyott does not consider the difficulties insurmountable if they are tackled in the right way. Incidentally, he recalls that the Murato Indians, who inhabit the Pastaza river country, have a legend which says that "when the 'White Man' comes with wings they are going to die." It is almost needless to say that Mr. Dyott took care not to mention the fact that he was a flying man, or the Indians might have thought to put off the evil day of their own extinction by killing him. Mr. Dyott will be willing to place any further information regarding the country at the disposal of those interested if they will communicate with him at Sardinia House, Kingsway, W.C.2.

#### The Hopkinson Memorial

For the Bertram and Cecil Hopkinson Memorial Trust Fund, Mrs. John Hopkinson has offered £2,000 towards the endowment of another chair connected with the School of Engineering in order to carry on the work so brilliantly developed by her son, Colonel Bertram Hopkinson, C.M.G., Professor of Mechanism and Applied Mechanics, who lost his life while flying last August.

The professorship is to be called the Hopkinson Chair of Thermodynamics. Further sums of £1,000 are offered by Mr. George A. Wills, £500 by Mr. Melville Wills, and £250 by Mr. Stanley Wills.

#### U.S. Aerial Mail Service

It is noteworthy that in connection with the celebration of the first anniversary of the New York-Philadelphia air mail service on May 15, it is proposed to use on regular flights the same six machines which began the service, and which are credited with more than eleven months' flying in all sorts of weather. Lieut. J. C. Edgerton, Chief of Flying Operations, is to take the mail to New York in the same machine used on the first trip from New York to Washington. More than

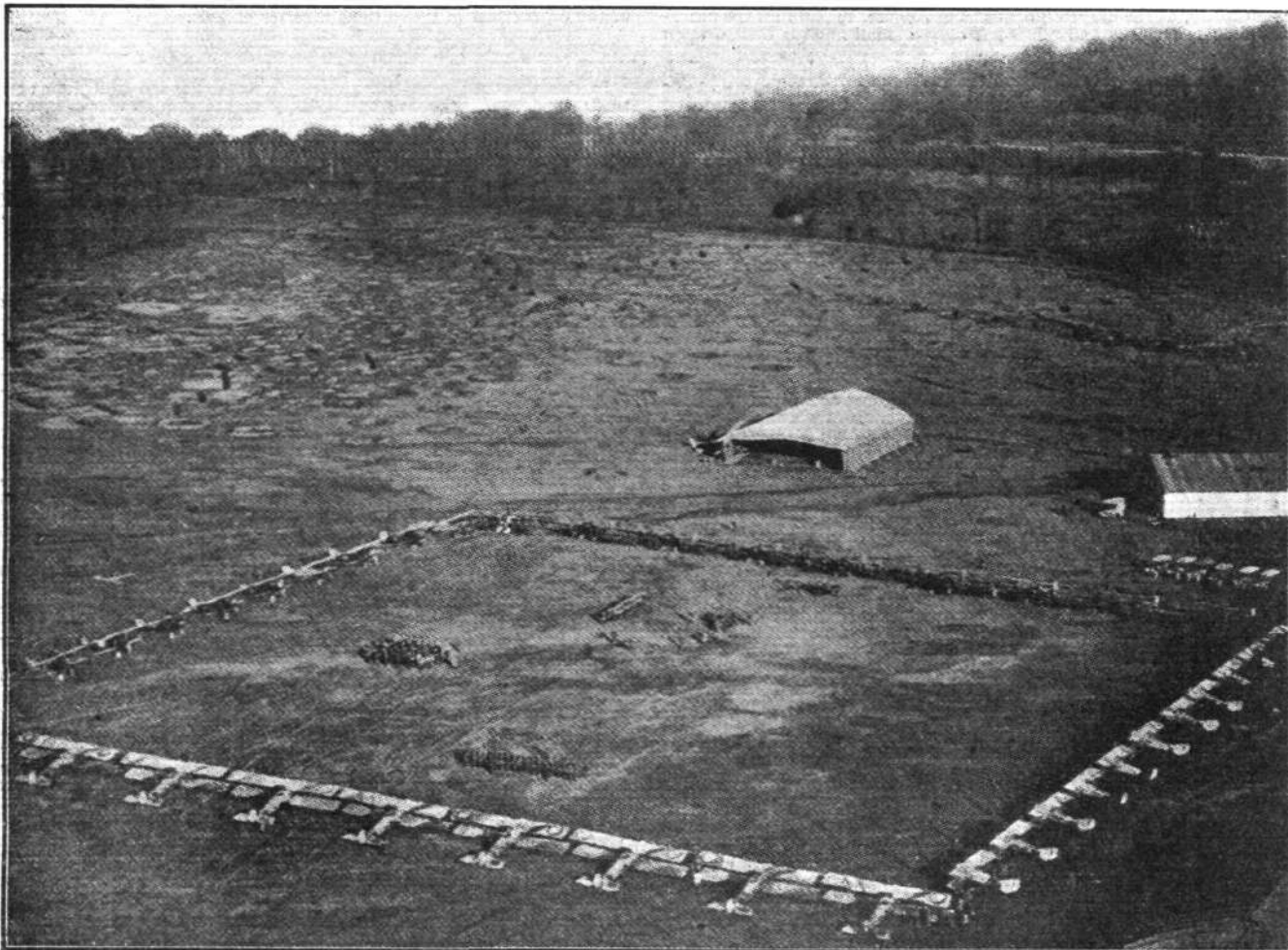
200,000 lbs. of mail, representing about 8,000,000 letters, have been carried. Some machines have a record of 200 flying hours (14,000 miles), but it is estimated that the life of a mail 'plane will average no more than 140 flying hours.

#### U.S. Studying the Fokker

WITH a view to studying, at first hand, the latest developments of the Fokker type of aeroplane, two officers of the U.S. Air Service have been specially sent to Holland. They have been ordered to The Hague for temporary duty, being detailed as military observers while engaged in this investigation work.

#### Brazilian Aerial Transport

COMMERCIAL aviation seems to be making definite progress in South America. A message from Rio de Janeiro states that a decree has been signed authorising the establishment, but no monopoly, of aerial transport of passengers and goods in Brazil and between Brazil and other countries. It is understood that an Italo-Brazilian company has submitted suggestions for the creation of a series of aerial navigation routes radiating from Rio de Janeiro in various directions from Rio Grande do Sul to the State of Amazonas.



AN AMERICAN "AERODROME AT COBLENTZ.—In the background is the former German training ground. In the foreground are American and surrendered German machines "squared" up on the occasion of the decorating of several officers of the U.S. 3rd Army

# SYNOPSIS OF BRITISH AIR EFFORT DURING THE WAR

## 1. Development of the British Air Service

### Early Organisation

The following was issued as a Parliamentary Paper on April 24. It is dated Air Ministry, January 1:—

On August 5, 1914, the British Air Service consisted of a Naval Wing, known as the R.N.A.S., a Military Wing, known as the R.F.C., and a Central Flying School. The Naval Wing, which was controlled by the Admiralty comprised an airship squadron recently taken over from the Military Wing and three aeroplane and seaplane squadrons with a total of 93 machines. The Military Wing, which was controlled by the War Office, comprised four aeroplane squadrons with a total of 179 machines. The two wings had a total combined personnel of 197 officers and 1,647 other ranks. The squadron was the tactical unit, and still remains so.

The Royal Aircraft Factory at Farnborough was mainly engaged on experimental work, and the bulk of the machines and equipment for the Air Service was supplied by private manufacturing firms.

On the declaration of war some additional squadrons were hastily formed by the R.N.A.S. from all available resources in the country, and certain cross-Channel and other vessels were chartered and converted into aircraft carriers. Two squadrons of aeroplanes manned by the R.N.A.S. were sent to Belgium with the Naval Division to attempt to defend Antwerp, and the aircraft flown from the carriers undertook the protection of the ship channels off the East Coast of England from minelaying, and made attacks on the German Frisian Coast. The squadrons with the Naval Division constituted the nucleus of the force which was later formed at Dunkirk, under naval control, for the attack of the bases at Zeebrugge and Ostend. The employment of the small aircraft carriers originated the practice, since largely developed, of carrying aircraft in men-of-war, in lighters, and in special large aircraft-carrying ships attached to the Fleet. At the same time, all pilots and machines of the Military Wing, available for service overseas, were mobilised and concentrated at Dover, and on August 13, 1914, four squadrons (56 machines) of the Military Wing, accompanied by an aircraft park, proceeded to France. The machines landed at Amiens, flew to Maubeuge, where there was an aerodrome, and at once commenced work in co-operation with the British Expeditionary Force.

These squadrons played their part in the retreat from Mons, and suffered heavy casualties both in personnel and machines, but with the advance to the Aisne sufficient reinforcements were sent out from home to make good the wastage and to permit of expansion, so that by the end of November, 1914, there were six squadrons in France, which were then divided into two wings of three squadrons each. This wing system of organisation was continued, and as further squadrons were sent to France new wings were formed, the administration of which was throughout 1915 centred in Headquarters, R.F.C., France. With a continued increase in numbers it was found that this method of administration was unwieldy, and in January, 1916, the first R.F.C. Brigade was formed. The organisation was now found to work satisfactorily, and, on the conclusion of the Armistice, the R.A.F. operating with the British Army in France consisted of six brigades, comprising 17 wings, 84 squadrons, five special-duty flights, and 26 miscellaneous units. The development of the Home organisation, to keep pace with the ever-growing requirements in various theatres of war, presented a problem of extreme difficulty, as the despatch overseas in August, 1914, of all the immediately available machines and pilots left only a small nucleus behind upon which to build.

### Machines and Engines

The bulk of the machines were supplied by eight private firms, who built to either Government or private design, and the remainder were produced by the Royal Aircraft Factory, at Farnborough. The orders placed with the contractors had been given under peace conditions, and were very small, particularly as the Government design of aeroplanes was, at the moment, in a state of transition.

The supply of engines presented a task of equal difficulty. On the outbreak of war, the aero-engine industry was practically non-existent: lack of experience, lack of skilled labour, and lack of suitable plant made its organisation and development at high pressure an extremely arduous undertaking. None the less steady progress was made, and in 1918 England possessed the largest and most efficient aircraft industry in the world.

Some idea of the growth of aeroplane and engine production during the War may be gathered by reference to the Appendix.

### Personnel and Training

Linked with the difficult problems of the supply of aeroplanes, engines, and other technical material were equally difficult problems involved in the supply of highly-specialised personnel. Chief among the latter was the question of the supply of pilots. For these, the main source was the Central Flying School at Upavon, which had accommodation for about 40 pupils, and from which many of the serviceable machines had necessarily been taken for the first overseas expedition. During the first six months of the War, instruction was further hampered by the scarcity of experienced instructors and by the fact that there were only four Government aerodromes in the British Isles. Civilian flying schools were pressed into use and fresh service stations constructed, with the result that by May, 1915, training was being carried out at 11 stations, and 234 officers were actually under instruction. In May, 1916, 15 training stations were in full working order and a further 10 in course of construction, with 963 officers and other ranks under flying instruction. In the same year, schools of military aeronautics were opened at Oxford and Reading, and, in addition to flying instruction, a high standard of technical education was aimed at. By March, 1917, there were 32 training stations in existence, 15 more under construction, and a school of special flying for training instructors. Cadet wings were started to deal with the influx of pupils, and special schools of aerial gunnery, aerial fighting, and artillery and infantry co-operation were established.

In addition, Egypt and Canada were provided with training facilities, and by December, 1917, there were 78 training squadrons at home, 15 in Canada, and five in Egypt. On the conclusion of the armistice there was a total of 199 training squadrons, and the pupils under instruction, inclusive of cadets, numbered 30,000; 21,957 pilots have been trained and graduated as efficient for active service, and, though the training of pilot and observer personnel has been one of the heaviest responsibilities of the Air Ministry, it is believed that the British system of training is the best that has yet been evolved. We have also rendered assistance in this respect to all our Allies, especially to the Americans, who have adopted our system. In the early days of the War, the urgency of the demand rendered it necessary for pilots to go overseas immediately they had reached the minimum standard of efficiency, and five hours solo flying qualified a pilot for France. This minimum time was gradually raised, and at present the official minimum is 35 hours, including five hours on the service type of machine to be flown overseas, and, in fact, very few pilots have done less than 50 hours before they are sent on active service. Apart from the actual instruction in flying, pilots and observers receive a specialised training for the particular work they have to do in connection with reconnaissance, aerial fighting, spotting and bomb-

ing for the fleet, anti-submarine, and army duties. The improved efficiency obtained from this scientific mode of training has been one of the principal factors in the attainment of the air supremacy.

In addition to the training of flying and observer personnel, it has been necessary to establish a number of technical schools in which equipment officers and other ranks receive suitable training in the various specialised branches of their work, such as engine construction, wireless telegraphy, photography, armament, navigation, etc. In the Appendix will be found a table setting forth the growth in personnel of the British Air Service since 1914. Then it consisted of 197 officers and 1,647 other ranks, whereas to-day there are 27,906 officers and 263,842 other ranks.

Turning to the developments in the general organisation, it will be remembered that for the first two and a half years of the War the expansion of the fighting air services was developed to a large extent by the Navy and Army along parallel lines, and there is no doubt that the existence of these separate air service organisations resulted not only in considerable unnecessary expenditure, but also in confusion and delay in obtaining supplies.

### Later Organisation

In February, 1917, an attempt was made to remedy these defects by the formation of an Air Board, upon which the Admiralty and the War Office were represented. All questions of supply were at the same time placed under an Aircraft Production Department of the Ministry of Munitions, which successfully solved this difficult problem. The Air Board became responsible for the design and allocation of aircraft and accessories, but the actual administration of the two services remained separate. Although this was an improvement on the old system, it was found that there was still considerable duplication of effort and waste of energy, and it was finally decided to amalgamate the two air services and to place them under one central control. Accordingly, in January, 1918, a Secretary of State for Air was appointed, and the Air Board was reconstituted as the Air Ministry to take over the administration of both the naval and military air services, which were amalgamated to form the Royal Air Force in April, 1918. Prior to this amalgamation, the organisation of the Royal Flying Corps at home consisted of a training division comprising 109 squadrons and 13 schools. The schools were directly under the training division, and the squadrons were organised into four training brigades with 22 wings. The R.N.A.S. consisted of a number of groups, which were administered directly by the Admiralty. It was recognised that both these systems were capable of considerable improvement, and a new organisation was set up. Great Britain was divided into five areas under the direct control of the Air Ministry, but each area was responsible for its own internal administration, and was sub-divided into training and operational groups.

It is under this new organisation that the main development in the air service has taken place, and it is claimed that the results achieved in all theatres of war, as well as in home defence, have more than justified the establishment of the Royal Air Force as an independent fighting force of the Crown.

It is not possible in this brief review of the development of the air services to enter into any great detail, nor has it been considered necessary to describe or to trace very closely the successive steps in its growth. It may be interesting, however, to give some few details of the development and achievements of the air services in the various theatres of war:—

## 2. Co-operation with the Army

### Western Front

In this theatre the British air service has expanded from four squadrons to 84 squadrons, with five special-duty flights and 26 miscellaneous units, such as aircraft parks, repair depôts, etc. Owing to the difficulty of collecting detailed records from some of the earlier formed units, and the fact that many records have either been lost or destroyed, it is impossible at the moment to give any accurate summary of operations in the air previous to July, 1916. Since that date careful records have been kept, and will be found collected in the Appendix. It is worth noting that from July, 1916, to November 11, 1918, the Royal Air Force on the Western front (including the Independent Force) destroyed or brought down 7,054 enemy aircraft, dropped 6,942 tons of bombs, flew over 900,000 hours (nearly 103 years) and fired over 10,500,000 rounds at ground targets.

In addition to the work of the main force working with the armies on the Western front, the operations of the Independent Force, R.A.F., are worthy of special mention. During 1914 and 1915 isolated raids were made by the R.N.A.S. on Cuxhaven, Düsseldorf, and Friedrichshafen, but shortage of material and other difficulties made it impossible to keep up sustained efforts. In October, 1917, the 8th Brigade, R.F.C., was formed to operate from the Nancy area against the German chemical and iron industries. This brigade accomplished much valuable work, but only consisted of three squadrons, and on April 1, 1918, when the Royal Air Force came into being, the Air Ministry immediately recognised the great possibilities of a policy of strategic interception, as well as the opportunities for striking at the moral of the German nation. Every effort was made to build up and maintain in the field a powerful striking force to execute a series of systematic raids on the key munition and chemical industries of Germany. Accordingly, on June 8, 1918, the Independent Force, Royal Air Force, was constituted, and the three squadrons of the original 8th Brigade, R.F.C., were gradually increased to 10. Of these, five were for day bombing, four for night bombing, while the tenth consisted of scouts for the protection of the raiding formations and for defensive operations against the enemy fighters.

The effect, both morally and materially, of the raids on German territory carried out during the summer of 1918 can hardly be over-estimated. The utterances of the German press and public bear eloquent testimony to the results of the new policy, and it is known that the German High Command were compelled to recall at least 20 fighting squadrons from the Western front, and to immobilise a large number of ground troops to man anti-aircraft batteries and an elaborate system of searchlights and balloon barrages. In fact, the policy was so successful that when the Armistice was signed on November 11, 1918, it was intended to increase the Independent Force to a total of 48 squadrons by the end of May, 1919.

### Dardanelles

The Air Force in the Gallipoli campaign was supplied entirely by the R.N.A.S. In spite of many and severe hardships and almost insuperable difficulties in regard to transport, supply, and workshop and repair arrangements, much excellent work was accomplished, particularly during the latter stages of operations. In addition to the normal duties of co-operating with the Army and the various units of the Fleet, the R.N.A.S. was called upon to photograph the greater portion of the Peninsula for map making purposes, and by means of these photographs the first very inaccurate maps were corrected.

Constant bombing operations were also carried out on various objectives on the Peninsula and in the Straits, and frequent raids were made on the enemy's lines of communication, on the mainland, and upon Constantinople itself.



The Dardanelles campaign was essentially a joint enterprise, and the fact that the Royal Naval Air Service was able to supply the needs of both Navy and Army is a tribute to its efficiency and adaptability. A single intelligence system was maintained, and the photographs and observations were distributed to both the naval and military staffs. Further, it is not too much to claim that the success of the evacuations from Suvla and Helles were, in a considerable measure, due to the reconnaissance and patrol work of the R.N.A.S. It was in this campaign that torpedoes were for the first time carried by aircraft, and three enemy ships were destroyed in the Dardanelles by this means.

#### Middle East

While the development of the R.F.C. was in progress in France, development on a similar, though smaller, scale was taking place in the Middle East. The organisation in this theatre began in connection with the Turkish operations against the Suez Canal early in 1915. As soon as the intended attack on the Canal became known, a flight of aeroplanes was made up by taking two machines which were on their way to India, and a few others which happened to be in Egypt for exhibition purposes. By the autumn of 1915 this flight had been expanded to a squadron and despatched to Mesopotamia, while one other squadron sent from England took its place in Egypt and became the nucleus of expansion for the Middle East. A training organisation was set up in Egypt, new units were trained, and early in 1916 the wing in Egypt was able to detach a squadron to Salonica. The organisation continued to develop, and in July, 1916, was formed into a brigade, with three service wings in Macedonia, Sinai, and Mesopotamia respectively, a training wing in Egypt, and a squadron in East Africa. In 1917 the Middle East Brigade became a Major-General's Command, and, in October, 1918, consisted of:—

Egypt—1 training brigade of 8 squadrons, 3 schools of special flying, 1 cadet wing, 1 school of military aeronautics,  
Palestine—1 brigade of 7 squadrons,  
Mesopotamia—1 wing of 3 squadrons,  
Macedonia—1 wing of 3 squadrons;  
In addition, the command included one aircraft depot, three aircraft parks, one aircraft factory, and a number of engine-repair sections. Details of the achievements of these units in their respective theatres will be found in the Appendix.

#### Italy

The British Air Service did not operate on the Italian front until November, 1917, after the Italian retreat from the Isonzo, when the Italian brigade was formed and despatched. A brief mention of the assistance given to our Allies in this theatre will be found on p. 581, and the results achieved are set out in the Appendix. It is acknowledged that our squadrons rendered very valuable assistance in turning the Austrian retreat into a rout.

#### Russia

Co-operation with the Russians in this theatre of war commenced in the latter part of 1916, and short details of the assistance given will be found elsewhere.

#### India

In 1917 two squadrons were provided for India, where they have played an important part in quelling trans-frontier risings.

#### Darfur

In 1916 a flight of aeroplanes was despatched from Egypt to Kordofan, and played a useful part in the expedition against Darfur.

#### Aden

During 1917 half a flight was despatched from Egypt to co-operate with the British forces at Aden, and a flight was sent to Jeddah to co-operate with the forces of the King of the Hedjaz.

#### Palestine

The Palestine Brigade was formed in 1917 by expanding the wing attached to the Egyptian Expeditionary Force. This in turn had developed from the nucleus of one flight, which was formed to co-operate with our troops in the defence of the Suez Canal early in 1915. The Air Force in this theatre has had an exceptionally splendid record, which culminated in the Palestine Brigade achieving complete air supremacy during the critical period of the final operations. No single hostile aeroplane crossed our line. It is worthy of note that such complete air supremacy has not been obtained elsewhere by any belligerent in any theatre of war.

#### Macedonia

The wing in Macedonia is also a very efficient organisation; it has maintained the best traditions of the Royal Air Force, and its work has been repeatedly praised by the Army Commander. During the present year its air supremacy has been almost complete.

#### Mesopotamia

The Air Force in Mesopotamia consisted in 1915 of a composite squadron of aeroplanes which was sent from Egypt. This squadron was severely handicapped through lack of machines, climatic conditions, and inadequate personnel. In 1916 one additional squadron was sent out to form a wing, which was placed for administration under the headquarters of the Middle East Brigade. This wing rapidly gained a marked ascendancy over the enemy's air service, which was manned and equipped by Germany. This supremacy has been consistently maintained, and the wing in Mesopotamia holds a record of good work under extremely difficult conditions which compares favourably with that of any wing in the Royal Air Force.

#### East Africa

Operations in East Africa were commenced by the R.N.A.S. sending out some seaplanes to operate on the coast late in 1914. Their early work is described later under the heading of "Co-operation with the Navy." In 1915 this force was brought up to a strength of two squadrons, the seaplanes being replaced by aeroplanes, and was placed under the orders of the military forces operating in the north. Most valuable reconnaissance work over dense bush country was carried out under difficult conditions. Every landing ground had to be constructed by making clearings in the bush, and at one time the lines of communication were over 600 miles in length. Shortly afterwards additional squadrons were sent out by the R.F.C. to operate further south and also did valuable work.

### 3. Co-operation with the Navy

#### Grand Fleet

In November, 1914, the R.N.A.S. supplied aircraft to the Fleet for reconnaissance purposes and defence against Zeppelins, and by the spring of 1915 a Transatlantic liner and two smaller vessels had been provided equipped with reconnaissance and fighter seaplanes. These were subsequently replaced by aeroplanes which were flown from the decks and turrets of ships while the latter were under way.

The potential value of aerial scouts was soon realised, with the result that several other large aircraft-carrying ships were added to the Fleet, and the practice was in process of being established by which each battleship, battle cruiser, and light cruiser was to carry its own aircraft on proceeding to sea.

By July, 1918, 70 aeroplanes were being carried by the Fleet as part of the battle equipment.

Few opportunities presented themselves for employment of these aircraft in the face of the enemy, but the arrangements for their employment prior

to, and during a Fleet action were systematically improved. Very valuable work was done during the battle of Jutland, in several raids into the Heligoland Bight, and in attacks on German airships met in the North Sea.

#### Anti-submarine Patrols

The patrol of waters infested by enemy submarines was commenced by the R.N.A.S. in September, 1914, and was gradually increased in scope until, at the time of the declaration of the armistice, there were no less than 39 seaplane and 26 aeroplane stations round the British coast and in the Mediterranean engaged on this duty.

The duties of the aircraft engaged consisted of carrying out patrols over the seas in search of enemy submarines, in escorting convoys, and in assisting surface vessels to hunt submarines known to be in their vicinity. It may be claimed that the success which has attended the anti-submarine campaign has been largely due to their activities.

#### Dover-Dunkirk Patrol

As mentioned on p. 578, the R.N.A.S. squadrons which proceeded to the Dunkirk district were engaged against the enemy very early in the War. Their numbers were gradually increased to eight fighters and bombers, and during the following four years an unremitting attack by air on the submarine bases at Zeebrugge, Ostend, etc., was carried out in spite of strong anti-aircraft defences.

The Dover-Dunkirk group also constantly assisted in denying the Dover Straits to enemy submarines, in attacking enemy aeroplanes proceeding to or returning from London, and in spotting for the British monitors, etc., bombarding the enemy bases and forts.

#### Harwich and the Nore

In addition to anti-submarine operations, the aircraft under naval orders in the locality of Harwich and the Nore has been continuously engaged in locating and destroying mines laid by the enemy off our coasts. Special long-distance reconnaissance work was also carried out from this area, and flights were made into localities infested with enemy seaplanes, and often resulted in heavy engagements, necessitating as many as five machine-guns being carried in the large seaplanes.

#### Mediterranean and Adriatic

In view of the great activities of enemy submarines in the Mediterranean and Adriatic Seas, the work of the aircraft engaged on anti-submarine duties has been of a most important character.

Anti-submarine aircraft have been stationed in the Aegean and at Malta, Gibraltar, and latterly at Alexandria. In the early part of 1917, a wing was also formed in Italy to assist the Otranto barrage in closing the southern end of the Adriatic to enemy submarines, and in bombing the Austrian naval ports in the Adriatic. These units have also assisted materially in protecting convoys and in harassing submarines in all parts of the Mediterranean.

Other functions have been the bombing of lines of communication and places of military importance in Turkey and Albania, and the defence of Allied territory from enemy aerial attack.

#### Dardanelles, Palestine, and the Red Sea

The operations of the R.N.A.S. in the Dardanelles, Palestine, and the Red Sea have already been referred to.

#### East and Central Africa

As already stated, seaplanes were sent to the East Coast of Africa early in 1915 to take part in the operations on the Rufiji River, the approaches to which had been fortified by the crew of the German cruiser "Königsberg," and rendered valuable assistance in locating the position of the cruiser and of the gun emplacements, and in directing the fire of our ships over the bush.

Several aircraft at a later date were sent to Lake Tanganyika to co-operate with the Belgian forces.

#### Archangel

In 1918 the aircraft carrier H.M.S. "Nairana" was sent to assist the Navy in the attack on this port. The seaplanes did valuable reconnaissance and bombing work, and materially assisted the capture of the port.

### 4. Airship Service

On the outbreak of war this service consisted of three airships only, with a personnel of 24 officers and 174 other ranks; there are now (November, 1918) 103 ships in service, with a personnel of 580 officers and 6,534 other ranks.

During the transportation of the original Expeditionary Force to France in 1914, two of the three existing airships assisted in patrolling the Channel. These were subsequently employed on similar patrol duties from Kingsnorth and Barrow. The third airship was based at Dunkirk in the early part of 1915 and co-operated with the Belgian artillery at Ostend. The development of our present airship service, however, may be said to date from February, 1915, when approval was given for the construction of the first S.S. airship. During the year, 27 ships of this type were completed, the construction of a further 20 was begun, and the new "Coastal" type was also developed. In the meantime, experiments were directed to extending the range and duration of patrols, and a number of other new types were produced and commissioned.

In August, 1915, an airship contingent was despatched to the Dardanelles, and was incorporated in the force referred to on p. 578. Its headquarters were at first at Imbros, but were subsequently transferred to Mudros. Early in 1916 an outlying station was formed at Kassandra for anti-submarine work. Towards the end of 1916 one airship was stationed at Dunkirk and another was sent to the R.F.C. for work in France. In 1917 a detachment was sent to Italy in connection with six airships purchased by the Italian Government.

The duties carried out by the airship service are reconnaissance, coastal and anti-submarine patrols, escorts and mine detecting.

### 5. Kite Balloons

Four units of this branch were sent to France to operate with the Army, and one unit was sent out to the Dardanelles in H.M.S. "Manica," a merchant vessel chartered and fitted out for the purpose.

The work of these units was so successful that additional sections were rapidly formed. The R.F.C. took over the balloon work on the Western front, and five other vessels were equipped for balloon service in East Africa, in the Mediterranean, and off the Belgian coast.

At the end of 1915 a great advance in the development of balloons was made by the introduction of the practice of towing them from ships under way. The invention of the French Caudron balloon in 1916 assisted in the development, and the employment of balloons towed from all types of ships, from submarines to battle cruisers, for reconnaissance and artillery spotting purposes was soon a prevalent practice.

By July, 1918, no less than 30 balloons were being taken to sea by the Grand Fleet on all occasions.

Balloons have aided materially in the anti-submarine campaign, and have been towed from drifters, trawlers, and motor-launches in large numbers for reconnaissance purposes when hunting submarines and also when escorting convoys.

The expansion on the Western front has also been great, and at the present time there are no less than 83 kite balloon sections of the Royal Air Force.

## 6. Home Defence

Enemy air raids on Great Britain did not assume serious proportions until 1915, before which hostile aeroplanes and airships came over merely for purpose of reconnaissance. During 1914 and 1915 the anti-aircraft organisation was under the control of the Admiralty. In 1915 a few machines of the 18th Wing were specially detailed for defence against air raids, and in February, 1916, when the responsibility for home defence was taken over by the War Office, No. 19 Training Squadron, in addition to its training duties, was entrusted with the defence of London against enemy aircraft attacks; in addition, detachments each consisting of two B.E.2 c. machines were stationed at various points around the capital.

The systematic training of night flying pilots was not commenced at Hounslow until the armament and fittings for night flying were standardised.

The first home defence Squadron (No. 39) was formed in May, 1916, and by the end of the year 11 home defence squadrons and one night training squadron had been formed and distributed throughout England.

During 1916 the squadron responsible for the defence of London accounted for five Zeppelins, and the squadron protecting the Tyne and Tees brought down one.

A home defence Wing was formed in September, 1916, and in April, 1917, on the formation of the northern home defence Wing at York, the existing home defence wing became the home defence Group. This was later expanded and finally became the 6th Brigade. The organisation of this Brigade now consists of six wings and 18 service squadrons in addition to 10 night training squadrons, four of which are night bombing squadrons. Its duties are: The aerial defence of England and South Scotland, co-operation with coastal batteries, the training of night flying pilots, and the formation of night fighting squadrons for the expeditionary forces. These night fighting squadrons had the valuable dual effect of reducing the enemy bombing of our back areas in France, and at the same time forming a first line of air defence against aerial attack on the British Isles.

The searchlight and anti-aircraft gun defences of London were at first under the control of the Admiralty, but in August, 1917, it was decided to place these and the aeroplane defences under a single command.

The London Aircraft Defence Area was accordingly formed under a general officer, and the results emphasise the importance of co-operation between all units of anti-aircraft defence.

## 7. Development of Special Functions

### Air Fighting and Development of Armament

In the early days of the War machines were either entirely unarmed or the pilot carried a revolver, service rifle, or Winchester repeater. Some German machines carried machine guns in August, 1914, and the R.F.C. first fitted an aeroplane with a gun in September. Since then continual progress has been made in this direction. The types of machine gun fitted are the Vickers and the Lewis, of which 19,500 and 18,400 respectively are in use in the R.A.F. to-day. The rate of fire of these guns has been greatly increased since their introduction: in the case of the Vickers from a normal 550-600 rounds a minute to 1,000, and in the case of the Lewis from 500 to 700 a minute. Synchronising gears have been invented, enabling the gun to be fired through the propeller at its full rate of fire. Continual improvements in the mountings have been devised both for the pilot and the observer, so as to bring the guns into the best possible positions for fighting, and also for rectifying faults and stoppages. A further great improvement has been the substitution of metallic disintegrating links for the original webbing belts used with the Vickers gun.

In addition to machine guns, continual experiments have been carried out with guns of considerably larger calibre, firing a shell weighing over a pound. Heavy armament has now reached a stage of definite equipment and a certain number of machines in the field have already been fitted with a 37-mm. gun firing a 1½-pdr. shell.

Sights are now compensated to allow for the speed of our machines as well as that of the enemy, and illuminated sights have been produced for night work.

Air fighting called for the development of special ammunition, and a number of types of incendiary, tracer, and armour-piercing bullets have been produced and supplied in addition to the standard bullet.

Owing to the great cold of the altitudes at which pilots must now fly (20,000 ft. and over) it has been necessary to make special heating apparatus both for the pilot and the engine. This apparatus is used in all night flying squadrons. A further difficulty arising from the rarefaction of the atmosphere at these heights has been overcome by the use of oxygen apparatus, which enables pilots to do their work under conditions which would otherwise be insupportable. At the other end of the scale is the low flying machine whose duty is to co-operate directly with the infantry and tanks in action and to attack, with bomb and machine gun, enemy trenches and troops on the march or concentrating for an attack. For work of this nature, which is carried out from a height of a few hundred feet, an armoured machine has recently been devised.

The development of fighting in the air proceeded very rapidly. The first recorded combat occurred in September, 1914, when, in spite of the rudimentary armament, a total of five machines was brought down. By the middle of 1915 fighting in the air had become a recognised feature in operations, and since then it has steadily increased in intensity. The tendency has been to eliminate the single combats of the early days in favour of battles between patrols, and, in many cases, between large formations of machines, as many as 70 or 80 being engaged at one time.

### Reconnaissance and Photography

The original and, at first, the only duty of the aeroplane in war was reconnaissance, and the earliest reconnaissance reports were of the utmost value. The information gained immediately prior to and during the retreat from Mons in 1914 was of the greatest possible assistance to the British and French armies. The effect of regular, rapid, and accurate reconnaissance at once made itself apparent.

With the development of trench warfare, it became necessary to supplement reconnaissance reports by full information as to the position of enemy trenches and the location of his batteries. In November, 1914, the first successful aerial photograph was taken of the village of Neuve Chapelle. During the early experimental stages photographs were taken at an altitude of 3,000 ft., but the rapid development of anti-aircraft fire has forced the aerial photographer to an altitude of 22,000 ft.

During the first month that the photographic section operated in France, only 40 negatives were taken. During October, 1918, 23,247 negatives were exposed and approximately 650,000 prints were issued. A high standard of photographic work has been reached, and whole areas of country, lines of railway, and trench systems have been photographed and accurate maps prepared.

The photographic section in 1914 consisted of two officers and three other ranks. Their outfit comprised two cameras and a portable box of developing chemicals. The photographic personnel at the present day consists of 250 officers and 3,000 other ranks, distributed throughout all theatres in which photographic work is carried out, and a large training school of photography has been formed at Farnborough. Up to September of this year as many as 5,287,826 prints of aerial photographs had been issued by the Air Service in the field.

### Artillery Co-operation and Wireless

It was realised from the first that one of the most important duties of the aeroplane would be co-operation with the artillery, and various methods of communication between machines and batteries or ships were devised. At first, signals were passed by evolutions of the machine over the target, and later by signal lamps or smoke balls fired from Very pistols. These, however, involved great delay and trouble in returning from target to battery as signals were only visible at close range.

At the outbreak of war the use of wireless telegraphy in connection with aircraft was in its infancy; a certain amount of experimental work had been carried out, but no standard types of apparatus had been adopted. Only one of the machines which left with the original Expeditionary Force was fitted with wireless apparatus, which was not employed until some stable condition was reached on the Aisne, when work in conjunction with the artillery was started. From this time onwards wireless grew very rapidly, and every battery was gradually equipped with a wireless receiving station; at the end of 1916 there were about 2,000 Air Service wireless operators and mechanics, and by the end of 1917 this number had increased to approximately 3,700. The earliest experiments in wireless telephony were carried out between Farnborough and Brooklands, but it was not until 1917 that anything like an efficient set was designed and demonstrated in the air. About this time, night bombing machines in France (F.E.2. b.'s) were fitted with C.W. transmitters, and this means of communication, which had a range of about 75 miles, proved of great value in reporting lighted enemy aerodromes and other suitable targets. At the present time there are about 80 C.W. wireless stations maintained by the R.A.F. in France alone, providing communications between various units in the field. There are also several hundred battery stations. To meet the steadily increasing demands for trained officers and operators, a training school was started in 1916 with about 30 officer pupils and 500 other ranks. This school has now 152 officers and 2,400 other ranks under instruction. The wireless branch now consists of approximately 520 officers and 6,200 other ranks.

### Bombing

In the early days of the War pilots sometimes carried a few small bombs to be dropped by hand as opportunity offered. The Germans made the first organised bomb raid on Compiègne during the retreat, but day bombing has now become a highly specialised operation, and the development of bombs and bombing aeroplanes has been carried to a high pitch of efficiency. The machines employed have steadily improved in range and weight-carrying capacity.

There has been a very great improvement in the size and destructive power of bombs, and progress in this direction has kept pace with the development of the lifting power of aircraft. Whereas in 1914 we were only using 20-lb. bombs, to-day, bombs weighing as much as 3,000 lbs. are in use.

High explosive and incendiary bombs are the chief types, whilst others of special design are employed for anti-submarine operations.

A special type of smoke bomb has also been evolved, which was very successfully used in the recent offensive in Palestine.

Bombing has been developed on all fronts, both in the form of organised raids by day and by night for short or long distances, and also as one of the principal weapons for use against troops and other ground targets by our low-flying machines.

## 8. The Aerial War Effort of the Dominions

### General Survey

The assistance rendered—especially in personnel—by the Dominions to the air forces of the Empire during the War has been fully proportionate to that given to the land forces. In 1915 the Dominion Governments, foreseeing the inevitable development of aerial co-operation in land and sea operations, initiated their support by offering to organise their own flying formations and by generally encouraging their younger men to volunteer and take up flying. Even prior to this many who aspired to qualify as pilots and observers were coming over to join the Royal Flying Corps and the Royal Naval Air Service, and during the whole course of the War service of the highest value has been performed by pilots from the Dominions who were destined to play an important part in building up and maintaining the air-fighting forces in every theatre of war. The following details give some idea of the extent of the efforts of the principal Dominions:—

### Australia

The inauguration of the Australian Flying Corps in 1915 was the result of an offer by the Australian Government to form a flying unit for co-operation with our Indian forces in Mesopotamia. Four flying officers and 60 other ranks arrived at Basra in May, 1915, and took part in the Kut operations. The first complete Australian squadron left Australia for Egypt in March, 1916, and later played an important part in the work of the 40th Wing in the Middle East Brigade. Three additional squadrons were organised for service in France, the first arriving there in August, 1917; these were responsible for the destruction of over 400 enemy machines between that time and the signing of the armistice. Further, four training squadrons were formed in England in which most of the Australian pilots were trained, the entire personnel being drawn from Australia or from the Australian Imperial forces in France. Some months ago a central flying school was created at Melbourne, and the aeroplane industry has now been definitely established in Australia.

The strength of the Australian Flying Corps in November, 1918, amounting to over 250 pilots and a total personnel of considerably over 3,000, gives an impression of the part played by Australia in gaining aerial supremacy.

### Canada

In the early days of the War a large number of Canadians came over to join the Royal Flying Corps and the Royal Naval Air Service, and as many as 800 officers and cadets had been enrolled in the former corps up to the time when a training centre for flying cadets was organised in Canada itself. A total of 1,239 Canadian officers have been seconded or attached to the Royal Flying Corps, Royal Naval Air Service, and the Royal Air Force, and, since training in Canada was begun, over 4,000 Canadian cadets have been commissioned in the flying services, while the number of other ranks transferred and subsequently commissioned is about 2,750. Altogether over 8,000 Canadians have served as officers in our flying services, and at the date of the armistice there were nearly 2,500 in the Royal Air Force, while 1,200 Canadian cadets were undergoing training in England and in Canada. It may be added that several Canadian firms have maintained a large output both of machines and engines; Canada was producing, in November, 1918, about 350 light machines and eight large flying-boats per month.

### New Zealand

Over 300 New Zealanders have served as officers in the British Flying Services during the war, and at the time of the armistice there were 142 cadets in training.

The Dominion has presented six aeroplanes to the Imperial Government and lent two others.

Since the outbreak of war, two Schools of Instruction in Aviation have been established in New Zealand.

### South Africa

On the outbreak of war many South Africans came to England to take up flying, and by the beginning of 1916 nearly 2,000 were serving in England



or Egypt as probationary flight officers. When the 28th Squadron Royal Flying Corps was sent to co-operate with the forces in East Africa, it was largely composed of South Africans, and came to be known as the South African Squadron.

The total number of South Africans who have been commissioned in the flying services is about 3,000, who have taken part in the campaigns in France, Egypt, Palestine, and Africa.

The Colony presented a large number of machines to the Imperial Government during the war.

## 9. Assistance to the Allies

### America

The Government of the United States has paid a striking tribute to the British Air Service by adopting our system of training. The first 500 American officer cadets to be trained went through the School of Military Aeronautics at Oxford, subsequently graduating at various aerodromes in England. These officers formed the nucleus of American schools which were eventually started both in the United States and in France. In addition to this training of American pilots, 10 American squadrons were partially trained in Canada under a reciprocal agreement whereby Canada obtained the use of certain American aerodromes at seasons when weather conditions rendered some of the Canadian aerodromes temporarily unavailable. Four of these squadrons completed their training in England, and were then attached to the R.A.F. in the field to gain experience under service conditions for six to eight months. The remaining six went direct to the American authorities in France. In all, about 700 American pilots have passed through our schools and graduated at our aerodromes.

An agreement was also entered into under which a pool of American mechanics up to a maximum of 15,000 at a time was maintained in England. This arrangement was mutually advantageous, as, while relieving the demand for skilled tradesmen in the R.A.F., it also assisted the Americans to train their own squadrons for service in the field. This personnel, coming from America untrained, was attached to training units for three to eight months, being then sent to France from time to time in the form of complete squadrons until a total of 50 squadrons was reached in accordance with the demands of the American Command in France.

We have also supplied large numbers of aeroplanes of modern standard type, and when the question of producing a standardised engine was considered, every facility was given and all our experience placed at the disposal of the American Government, with the result that the Liberty engine was evolved. Some 95 officers were sent out to the United States to assist in an advisory capacity, and a large number of American officers have both visited and undergone courses at most of the schools and training stations of the Royal Air Force. In addition, a very large amount of material, supplies, samples, drawings, and technical information was supplied to both the American Army and Naval Aviation Services.

### France

We have assisted the French Government to a considerable extent in training her pilots, more especially in aerial fighting. For this purpose four Gosport instructors, together with four mono-Avro aeroplanes, were sent to France. We have supplied 48 complete machines and various new types of engines to the French Government, and an order for 150 Sunbeam engines is on the point of completion. About 600 Hythe gun cameras were also supplied during 1917-18 to the French schools for training purposes. French officers have constantly visited this country with a view to studying our methods, and have been given every facility for visiting schools, training centres, and technical establishments.

### Italy

Immediately after the Italian retreat in November, 1917, four British aeroplane squadrons were sent to the Italian front to co-operate with the Italian Air Service and with the British forces in Italy; these four squadrons have been maintained and a fifth squadron has recently been added. The brief record of the work performed by these squadrons, given in the Appendix, illustrates the valuable assistance they have rendered to our Ally. During 1918 the Italian Government were supplied with 150 Vickers guns each month, and with upwards of 2,000 Lewis guns. A number of Hythe gun cameras have been sent out, and between 200 and 300 sights and lenses, as well as photographic chemicals.

### Belgium

In 1916 a number of Sopwith 1½ strutters were provided by the R.N.A.S. In 1917, 22 more machines of this type were supplied, and 22 R.E. 8's for artillery co-operation. In 1918, 36 "Camel" and 18 D.H. 9 machines were furnished to the Belgian Aviation Corps.

### Greece

The Greek Government have been supplied with 20 seaplanes; 40 D.H. 6 machines and six Sopwith "Camels," together with complete equipment and transport, had been allotted and were ready for despatch, but have been held back owing to the cessation of active hostilities.

### Russia

In 1916 a mission was sent to Russia to assist in training and organising the Russian Flying Corps, and during the latter part of 1916 and during 1917 Russia was supplied with 251 aeroplanes. In May, 1918, orders were issued for the despatch of a R.A.F. contingent in conjunction with a special mission which was being sent to Northern Russia to operate from Archangel. The force consisted of eight D.H. 4 (R.A.F. 3A) machines with a complement of personnel and stores. On arrival at Archangel sufficient machines were collected from those which had previously been sent to Russia to form two squadrons of Nieuports and 1½ strutters. In August, 1918, reinforcements were despatched to Archangel, consisting of a proportion of British officers, N.C.O.'s, and men, a wing headquarters, an Intelligence Section, one flight of R.E. 8's, and two Repair Sections for engines and aircraft respectively. On November 12, 1918, a further reinforcement of six Sopwith scouts and a six months' supply of stores were despatched.

### Japan

Several officers have been undergoing courses on aeroplanes and seaplanes. Seventy-seven complete machines and 100 Le Rhone engines have been supplied.

### Brazil

Several officers have graduated as pilots under the tuition of our instructors. Two flying boats have been supplied to the Brazilian Government.

### Roumania

Several officers have been given instruction and have graduated as pilots. Twenty Sopwith machines have also been supplied.

## APPENDIX.

### Personnel

	August, 1914.			December, 1916.		
	Officers.	Other ranks.	Total.	Officers.	Other ranks.	Total.
R.F.C. ..	147	1,097	1,244	5,982	51,915	57,897
R.N.A.S. ..	50	550	600	2,764	26,129	28,893
R.A.F. ..	..	..	..	..	..	..
Total ..	..	..	1,844	..	..	86,790

	December, 1917.			October, 1918.		
	Officers.	Other Ranks.	Total.	Officers.	Other Ranks.	Total.
R.F.C. ..	15,522	98,738	114,260	..	..	..
R.N.A.S. ..	4,765	43,050	47,815	..	..	..
R.A.F. ..	..	..	..	27,906	263,842	291,748
Total ..	..	..	162,075	..	..	291,748

### Machines and Engines on Charge

	August, 1914.		January, 1917.		January, 1918.		October, 1918.	
	Machines.	Engines.	Machines.	Engines.	Machines.	Engines.	Machines.	Engines.
R.F.C. ..	179	..	3,929	6,056	8,350	14,755	..	..
R.N.A.S. ..	93	..	1,567	3,672	2,741	6,902	..	..
R.A.F. ..	..	..	..	..	..	..	22,171	37,702
Total ..	272	..	5,496	9,728	11,091	21,657	22,171	37,702

### Output of Machines and Engines

	August, 1914, to May, 1915 (10 months).		June, 1915, to February, 1917 (21 months).		March, 1917, to December, 1917 (10 months).		January, 1918, to October, 1918 (10 months).	
	Machines.	Engines.	Machines.	Engines.	Machines.	Engines.	Machines.	Engines.
R.F.C. ..	530	141	7,137	8,917	12,275	..	..	..
R.N.A.S. ..	No record.	No record.	No record.	No record.	1,246	..	..	..
R.A.F. ..	..	..	..	..	..	..	26,685	29,561
Total ..	530	141	7,137	8,917	13,521	13,979	26,685	29,561

### Expansion of Motor Transport

Motor Transport (all Types).	R.F.C. Only.				R.A.F.
	August, 1914.	August, 1915.	August, 1916.	August, 1917.	October 31, 1918.
On charge ..	320	2,469	5,282	8,584	23,260

### Squadrons Maintained

	Service.		Training. (1 Training Depot Station reckoned as 3 Squadrons)	
	Aug., 1914.	Oct. 31, 1918.	Aug., 1914.	Oct. 31, 1918.
Western Front Force	4 (R.F.C.) ..	84 and five flights	Home ..	1 (R.F.C.) ..
5 Group ..	..	10 ..	2 (R.N.A.S.)	..
India ..	..	3 ..	Egypt ..	..
Italy ..	..	2 ..	Canada ..	..
Middle East ..	..	4 ..	..	10
Russia ..	..	13 ..	..	15
Home defence	..	18 ..	..	..
Naval units	1 (R.N.A.S.)	64	..	..
Total ..	5	198½ and 5 flights	3	199

## Results of Operations in the Air

	July, 1916, to Nov. 11, 1918.	January 1, 1918, to November 11, 1918.			
	Western Front.	Inde- pendent Force.	Home Forces.	5th Group and Naval Units.	Italy.
Enemy aircraft ac- counted for, i.e., brought down or driven down.	6,904	150	8	470	405
Our machines missing	2,484	111	..	114	44
Bombs dropped (tons)	6,402	540	..	662	59
Hours flown	889,526	11,784	..	39,102	25,206
Rounds fired at ground targets.	10,238,182	353,257	..	..	222,704
Photographs taken	401,375	3,682	..	3,440	14,596
Enemy balloons brought down.	258	..	..	..	..

## January 1, 1918, to November 11, 1918.

	Egypt.	Meso- potamia	Sal- nika.	Pales- tine.	India (Aden)	Total.
Enemy aircraft ac- counted for, i.e., brought down or driven down.	25	6	59	81	..	7,998
Our machines missing	9	13	8	24	..	2,810
Bombs dropped (tons)	43	25	130	74	30	7,945
Hours flown	7,022	7,862	13,417	21,848	579	1,016,346
Rounds fired at ground targets	59,937	107,563	193,354	735,550	7,527	11,858,137
Photographs taken	8,135	66,720	15,587	27,039	542	501,116
Enemy balloons brought down.	..	..	..	..	..	258

NOTE.—Records are not available of results obtained by Expeditionary Force, Western Front, prior to July, 1916, or by 5th Group and Naval Units, or in Eastern Theatres prior to January, 1918. The absence of these records, however, will not materially affect the totals shown as regards enemy aircraft accounted for, our machines missing, or the weight of bombs dropped, owing to the comparatively recent growth in intensity of aerial fighting and the smaller number of aircraft engaged.

# THE ROYAL AIR FORCE

London Gazette, April 25

The following temporary appointments are made:—  
Staff Officer, 2nd Class.—(Air) Maj. R. M. Field; March 17.  
Staff Officer, 3rd Class.—(Air)—Capt. F. W. Walker, D.S.C., A.F.C.; March 24.  
Staff Officer, 4th Class.—(P.)—Lieut. B. H. Godfrey; March 5.  
The following temporary appointments are made:—  
Staff Officer, 1st Class. (P.)—Maj. (actg. Lieut.-Col.) A. G. R. Garrod; April 7.  
Staff Officer, 3rd Class.—(P.)—Lieut. (actg. Capt.) D. W. Stewart-Saville, M.C., and to retain actg. rank of Capt. whilst so employed; Jan. 3.

### Flying Branch

Capt. A. J. O'Reilly to be actg. Maj. whilst employed as Maj. (K.B.); Oct. 1, 1918.  
Lieuts. to be Lieuts. (O.) from (Ad.):—J. L. Rowe; March 28. J. F. Titmas; April 9.  
Sec. Lieut. C. W. Harrison to be actg. Lieut. whilst employed as Balloon Comm. (K.B.); Oct. 19, 1918 (substituted for notification in Gazette of March 19.)

The following relinquish their commns. on ceasing to be employed:—  
Lieut. B. E. Gilbert (Lieut. W. Ont. R.); Dec. 14, 1918. Sec. Lieut. (Hon. Lieut.) F. P. J. Travis (Lieut., Quebec R.); Feb. 2. Lieut. T. F. Flanagan (Lieut., E. Ont. R.), Lieut. J. R. Rodger (Lieut., Alb. R.); March 17. Sec. Lieut. (Hon. Lieut.) T. C. Knowles, M.M. (Lieut., Brit. Col. R.), Sec. Lieut. (Hon. Lieut.) S. Knight (Lieut., Can. Rly. Serv.); March 19. Lieut. (Hon. Capt.) A. R. C. Morton (Capt., Brit. Col. R.); March 20. Lieut. W. Ridley, D.F.C. (Lieut., Brit. Col. R.); March 25. Sec. Lieut. (Hon. Lieut.) F. H. Allwood (Lieut., Can. F. Art.); March 28. Lieut. (Hon. Maj.) (actg. Capt.) F. I. Tanner (Maj., Nova Scotia R.); April 14.

(Then follow the names of 241 officers who are transfd. to the Unemployed List under various dates. We regret that owing to great pressure on our space it is impossible to reprint this portion of the list.—Ed.)

Maj. (actg. Lieut.-Col.) J. A. Cunningham, D.S.O., D.F.C., resigns his commn., and is permitted to retain rank of Lieut.-Col.; April 26.

Sec. Lieut. (Hon. Lieut.) M. G. Robson relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain rank of Lieut. April 26.

Sec. Lieut. B. Digby-Worsley relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; April 26.

Sec. Lieut. G. Roberts (late Gen. List, R.F.C., on prob.) is confirmed in his rank as Sec. Lieut. (A); July 7, 1918 (substituted for notification in Gazette Nov. 26, 1918, page 1,392).

Rank of Sec. Lieut. A. Beck is as now described, and not Lieut. (actg. Capt.) stated in Gazette March 28.

Initials of Lieut. A. C. Anderson are as now described, and not A.C.D., as stated in Gazette March 7.

### Administrative Branch

Lieuts. to be actg. Capts. while employed as Capts.:—(Hon. Capt.) R. G. Kitson, from (O); May 18, 1918 (substituted for notification in Gazette Jan. 24). H. F. W. Bailey; July 20, 1918. W. E. N. Growden; April 5. M. J. Norton, from (A. and S.); Jan. 1.

Lieuts. (A) to be Lieuts.:—C. F. Palmer; Nov. 14, 1918. C. A. Jordan; Feb. 3. M. G. Begg, M.C.; Feb. 18. D. S. Cairnes; March 3. I. R. V. Hill, J. M. Purcell; March 4. R. A. Maddock; March 7. H. Austin; March 14. C. W. E. Browne; March 17. A. Colley, T. P. L. Molloy, J. L. Sawyer; April 17.

Lieut. S. Wallingford to be Lieut., from (A. and S.); March 12.

Lieuts. (K.B.) to be Lieuts.:—A. J. Johnston; Feb. 17 (substituted for notification in Gazette of March 14). (Hon. Capt.) G. S. St. Noble; March 6. F. G. Taylor; March 11.

Lieuts. (O) to be Lieuts.:—J. St. G. George; Nov. 25, 1918. A. Lomax M.C.; Nov. 28, 1918. E. D. Warburton; Dec. 15, 1918. J. Y. Baird; Feb. 22.

Lieut. J. W. Hustwaite to be Lieut., from (S.O.); April 1 (substituted for notification in Gazette, April 18).

G. A. Miller (Temp. Lieut. E. Surr. R.) is granted a temp. commn. as Lieut.; July 18, 1918, with seniority from April 1, 1918.

Sec. Lieut. H. T. Joy to be Lieut.; Feb. 30.

R. H. Walker (Sec. Lieut., Essex R.) is granted a temp. commn. as Sec. Lieut., and to be actg. Lieut. whilst employed as Lieut.; April 1, 1918.

### London-Bristol Airway

To-day, to celebrate the emancipation of civil flying, when the Government air route from Bristol to London is inaugurated, a flight will be made to the capital by a Bristol

Sec. Lieuts. to be Sec. Lieuts., from (A):—C. S. Dunbar Nov. 6, 1918. W. W. McBain; Dec. 3, 1918. A. Barrington; Dec. 16, 1918. Wilson Campbell; Jan. 17. H. S. Stidston; Jan. 23 (and to be Hon. Lieut.), J. Silvester; Feb. 4.

Sec. Lieuts. to be Sec. Lieuts., from (A. and S.):—G. W. Irving, A. H. Betteridge; April 4.

Sec. Lieut. P. Lavery to be Sec. Lieut., from (K.B.); Jan. 3.

Sec. Lieuts. to be Sec. Lieuts., from (O):—T. W. Hopley; Nov. 29, 1918. F. A. A. Hewson; Dec. 11, 1918. F. H. Perry; March 1. G. Storey; March 4. M. G. Robson, M.C.; April 3 (and to be Hon. Lieut.). J. T. White; April 4.

(Then follow the names of 42 officers who are transfd. to the Unemployed List under various dates.)

Sec. Lieut. O. W. Owen resigns his commn.; April 26.

The notification in Gazette, Oct. 15, 1918, concerning Lieut. O. J. Gagnier is cancelled.

The notification in Gazette, March 25, concerning Lieut. G. T. Dunstan is cancelled.

The notification in Gazette, March 4, concerning Sec. Lieut. (Hon. Lieut.) J. Cobby is cancelled.

The notification in Gazette, April 11, concerning Sec. Lieut. E. Holt is cancelled.

The notification in Gazette, Feb. 14, concerning Sec. Lieut. T. Whittaker is cancelled.

### Technical Branch

Capt. (actg. Lieut.-Col.) H. A. P. Disney retains the actg. rank of Lieut.-Col. whilst employed as Lieut.-Col., Grade (B) from S.O.; April 1.

Maj. (actg. Lieut.-Col.) A. Cleghorn to be Maj., Grade (A), and relinquishes the actg. rank of Lieut.-Col. on reduction of establishment; April 3.

Capt. A. Roberts to be Capt., Grade (B) from Grade (A); Jan. 22.

Lieut. (hon. Capt.) O. M. Greg to be Lieut. (hon. Capt.), Grade (B), from Grade (A); Feb. 3.

Sec. Lieut. F. H. Whitmore, D.S.C., to be actg. Lieut. whilst employed as Lieut., Grade (A); Aug. 1, 1918.

Lieut. W. R. Exley to be Lieut., from (Ad.); Jan. 1.

Sec. Lieuts. to be Sec. Lieuts., Grade (A) from (Ad.):—R. F. Tunmer; Nov. 18, 1918. H. R. Stubbington; Nov. 25, 1918 (substituted for the notification in Gazette of Dec. 24, 1918).

Sec. Lieuts. to be Sec. Lieuts., Grade (B) from (Ad.):—F. W. Turner, J. Weeks, A. Sowden (substituted for the notification in Gazette of Dec. 24, 1918; Nov. 25, 1918).

Sec. Lieuts. to be Sec. Lieuts., from (Ad.):—E. Hennen; Jan. 11. M. D. Hart; Jan. 17.

Sec. Lieuts. to be Sec. Lieuts. from Grade (A):—C. F. Soanes; Jan. 14.

J. K. M. Dodds; Jan. 15 (and to be hon. Lieut.).

Sec. Lieut. T. Lund to be Sec. Lieut., Grade (B) from (A); Jan. 13.

Sec. Lieut. (hon. Lieut.) R. H. Hampton to be Sec. Lieut., Grade (B) from (K.B.); Jan. 15.

Sec. Lieut. A. N. Goodwin (late Gen. List, R.F.C., on prob.) is confirmed in his rank as Sec. Lieut., Grade (A); Sept. 10, 1918.

(Then follow the names of 85 officers who are transfd. to the Unemployed List under various dates.)

The following relinquish their commns. on account of ill-health:—Capt. (actg. Maj.) D. G. Nairn, O.B.E. (R.A.S.C., T.F.), Capt. B. May (R.W.K.R.), contracted on active service; April 26.

Lieut. J. R. Taverner relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; April 26.

Sec. Lieut. (Hon. Lieut.) C. B. Swanstone relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain the rank of Lieut.; April 26.

Sec. Lieut. E. Holt relinquishes his commn. on account of ill-health, and is permitted to retain his rank; April 12.

The notification in Gazette of April 1 concerning Lieut. H. Gray is cancelled.

### Medical Branch

The following are transfd. to the Unemployed List:—Capt. T. Gibbins; March 28. Capt. J. Allen; April 5. Capt. W. M. Jeffreys; April 6. Capt. L. C. Blackstone; April 8.

### Memoranda

Lieut. J. S. Flanagan to be hon. Capt.; March 31.

(Then follow the names of 11 officers who are transfd. to the Unemployed List under various dates.)

two-seater biplane, in the warm, closed-in passenger coupé of which will be Mr. Herbert J. Thomas, director and works manager of the British and Colonial Aeroplane Company.



## THE TRANSATLANTIC FLIGHT

LITTLE falls to be recorded for the past week in connection with the competition for the *Daily Mail* prize, the start of both the Sopwith-Rolls-Royce and the Martinsyde-Rolls-Royce still being delayed by the weather. It would appear that a week ago the conditions along the route were favourable, but conflicting reports were received at St. John's, and it was deemed advisable not to start. As the origin of these erroneous reports is shrouded in mystery, steps have been taken by the Air Ministry to prevent any interference with the official meteorological intelligence service, and the reports will probably be transmitted to the navigators in code in future.

Among the final details arranged is the method by which the competitors will indicate their crossing of the Irish coast, which may be at any point between Malin Head and Cape Clear. Mr. Hawker has decided to throw his charts

The same methods will be employed by Mr. Raynham and Captain Morgan in their Martinsyde-Rolls-Royce.

It is expected that the most favourable weather conditions will next be met with just before, during, or immediately after the full moon. This is roughly between May 12 and May 19, but Mr. Raynham and Mr. Hawker will not wait if other conditions are suitable.

As at present arranged, the flight should begin between 5 p.m. and 7 p.m. (Greenwich time), and it is hoped to make the Irish coast about 19 hours later. If, as intended, the machines are able to proceed to Brooklands, a landing should be made there about 7 p.m., Greenwich time (i.e., 8 p.m. summer time), on the day following the start. Throughout the flight Greenwich time will be used.

The Ardath Tobacco Company, Limited, have offered\* an additional prize of 2,000 guineas to be given to the winner



**THE TRANSATLANTIC RACE.**—Three-quarter rear view of the Sopwith-Rolls-Royce machine, the "Atlantic." The detachable boat, which forms the turtle back of the rear portion of the fuselage, is clearly shown. The windmill projecting through the port side of the fuselage drives the generator for the wireless set. When not in use, it can be swung inboard. Being driven by a windmill the generator can be worked when the engine is stopped, as during a glide

and maps overboard with a message asking the finder to forward them to the Royal Aero Club, London. The time of reaching the coast and other identification marks will be written on the back of the charts.

Mr. Raynham has decided to utilise message bags with streamers. Captain Morgan, his navigator, will write the messages and throw them overboard as soon as the coast is crossed. Everyone within ten miles of the Irish coast is asked to keep a look-out for these papers.

In the event of a mishap occurring at night, a white parachute flare will be burnt. This is not unlike the flares used by the Zeppelins over London, and will be seen for miles. Lieut.-Commander Mackenzie-Grieve, the navigator of the Sopwith-Rolls-Royce, asks that it should be clearly understood that the white light or a wireless "S.O.S." will indicate only an emergency when help will be required quickly. If they desire to communicate with a ship for direction purposes a red flare and wireless will be used.

### The Weyhill Disaster

At the inquest in connection with the accident at Weyhill Aerodrome, by which Major T. A. Batchelor, D.F.C., Capt. W. R. Adkins, Lieut. A. B. Whiteside, M.C., Flight-Sergt. H. Heales, and Corpl. E. G. Ward lost their lives, the evidence failed to bring out the cause of the accident. The engines had previously been tested and found to be all right, but, according to the evidence of Flight-Sergt. Smith, one of the survivors, the machine did not appear to climb, after it had taken off, and it was also sluggish. A verdict of "Accidental death whilst on duty" was returned.

### Long-Distance Trial by U.S. Flying-Boat

ONE of the United States flying-boats, known as F 5, on April 26 remained in the air for 20 hours and 10 minutes, covering during that time a distance of 1,250 miles. It left Norfolk, Va., at 11.42 a.m. on April 25 and alighted at 7.52 the following morning. Those on board were Lieut.-Commander H. B. Grow and Ensigns Delos, T. R. F. Souther and Irvine. They took turns at piloting, though Commander Grow was at the wheel during the greater part of the time.

of the *Daily Mail* £10,000 prize for the first Atlantic flight.

The United States Navy Department has now selected the crews for the three flying boats which it is proposed should attempt the flight across the Atlantic. The crew of the NC 1 will consist of Commander Richardson, Lieut. McCulloch, Lieut.-Commander Lavender, Engineer Moore, and Lieut. Rhodes.

The crew of the NC 3 will be Lieut. Stone, Lieut. Honton, Ensign Rodd, Engineer and Chief Mechanic Howard, and Lieut. Breese.

The crew of the NC 4 will comprise Lieut.-Commander Mitscher, Lieut. Barin, Lieut. Sadenwater, Engineer and Chief Machinist Mate Kesler, and Machinist Christensen.

The boats will be flown from Rockaway Beach to the base in Newfoundland, but the route across the Atlantic has not been definitely decided upon.

Most of the flying was done over Hampton Roads, Newport News, and Norfolk, but on one occasion the machine went as far as Baltimore. There was a strong north-west wind, and the temperature was at freezing-point. When the machine started from the naval base it carried 850 gallons of petrol, and at the end it had scarcely two gallons left. F 5 is equipped with two Liberty engines; the span of the machine is given as 105 ft.

### Ex-Flying Officers' Luncheon Club

It is proposed to start in the City a luncheon club for ex-officers of the Flying Services, to meet at a separate long table at one of the central City restaurants. Any ex R.A.F., R.N.A.S., or R.F.C. pilot or observer who may now be demobilised and engaged in the City, and who is interested in the idea should communicate in the first instance by letter with Major Modin, "Durrington Lodge," The Crescent, Surbiton. It is proposed to hold a meeting one evening in the City at an early date, when the question can be fully discussed, a "Mess Committee" nominated, and so forth.

# Personals

## Casualties

Maj. THOMAS A. BATCHELOR, D.F.C., R.A.F. (late R.N.A.S.), who was killed on April 22, at the age of 32, in a flying accident at Andover aerodrome, was the husband of Una Batchelor Glenlyon, Alexandra Road, Andover.

Sec. Lieut. ALAN HUGHES FENTON, R.F.C., previously reported missing, now known to have been killed in aerial flight on March 4, 1917, at the age of 23, was the only son of Mr. and Mrs. James Fenton, Oldfield, Worples Road, Wimbleton.

## Married

Capt. EDWARD NOEL G. GRIFFITH, R.A.F., son of Col. and Mrs. Griffith, Deanwood House, Cheltenham, was married on April 21 at Witney Parish Church, to MAUDE LYLE, widow of Lieut. REAY PARKINSON, R.N., only daughter of Capt. Hooper, Bishop's Stortford.

Capt. IGNATIUS GEORGE KELLY, R.A.F., eldest son of the late David Frederic Kelly, Professor of Classics in Adelaide University, was married on April 26 at Bramshott Church, to ELLA FRANCES, younger daughter of the late ARTHUR WILLIAM D'ARENBERG.

Capt. ROBERT BEGGIE LONGRIDGE, 16th Lancers and R.A.F., younger son of R. Charles Longridge, was married on April 23 at St. John Baptist, Knutsford, to ALICE MARY, only child of Capt. the Hon. C. T. and Mrs. HOLLAND, of Leamington.

Capt. IAN MCEWEN, 2nd Seaforth Highlanders and R.A.F., only son of Mr. John Forrester McEwen, of Villa Razzolini, Florence, was married on April 16 at Shere Church, Surrey, to Miss AMETHE SMEATON, daughter of the late Mr. Donald Smeaton, M.P., C.S.I., and Mrs. Smeaton, of Lawbrook, Gornshall.

Lieut. FRANK ROLAND MANGHAM, R.A.F., twin son of Harry Mangham, B.A., and Mrs. L. Mangham, was married on April 14 at St. Mary's, Balham, to ELSIE MAUD HESELTINE, eldest daughter of the late W. J. Heseltine and Mrs. Heseltine.

Capt. B. CROSSLEY MEATES, R.A.F., elder son of Mr. and Mrs. Henry Meates, Oakland Court, Cheltenham, was married on April 22 at the Royal Chapel of Savoy, London, to FLORENCE, only daughter of the late J. G. SEARS and Mrs. Sears, of Collingtree Grange, Northampton.

Capt. DENHAM EDGAR RODWELL, R.A.F., second son of Mr. and Mrs. H. E. W. Rodwell, of 100, Philbeach Gardens, London, was married on April 24 at the Parish Church, St. Mary Bourne, Hants, to NESTA, only daughter of the late R. T. A. CLARKE and Mrs. Clarke, of Warwick House, St. Mary Bourne.

## Items.

Lieut. J. S. McD. BROWNE, 19907, R.A.F., was last seen flying Le Rhone Camel 9510 from No. 4 Squadron, Australian Flying Corps, Hazebrook Sector, on June 27, 1918. Anybody who can give information concerning his fate is requested to write to Lieut. W. G. M. Browne, R.A.F., Lyndhurst Avenue, Toronto, Canada.

The will of MAJOR SIR BRYAN BALDWIN M. LEIGHTON, 3rd Bart., of Wellington Court, has recently been proved at £32,522.

The will of CAPTAIN WILLIAM LEEFE ROBINSON, V.C., R.A.F., of 36, Vineyard Hill, Wimbledon Park, who died on December 31, after returning from captivity in Germany on December 14, has been proved at £2,346.

Lieut. THOMAS N. PHILLIPS, 103rd Squadron, who was posted as missing on September 18, 1918, was last seen piloting his D.H. 9 machine in company with Observer-Lieut. R. E. OWEN, on a bombing raid in the vicinity of Lille, the machine being seen to spin down to the ground. Anybody who can give information concerning his fate is requested to write to Mr. Howell Phillips, 8, Penfillia Terrace, Brynhyfrud, Swansea, S. Wales.

The will of Capt. VERNON FRANCIS SYMONDSON, R.A.F., killed in France, has been proved at £5,803.

## RESETTLEMENT OF R.A.F. PERSONNEL

THERE are many officers and men of the R.A.F. who are demobilised or are about to be demobilised.

In order to assist those who are undecided or are seeking advice as to their prospects in civil life, the Editor has arranged for an expert, with wide experience of service, industrial and educational conditions, to give advice to those who may solicit it through the medium of this Journal.

Applications, which must be in writing, should be marked *Resettlement*, and addressed to the Editor, FLIGHT, 36, Great Queen Street, Kingsway, W.C.2. They will be dealt with in these columns, as far as possible, in rotation.

S. C., EX-SQUADRON-COMMANDER.—We think you will be best advised to pass your final examination first. This will ensure that you will be fully qualified for your normal profession, which will always be an asset even if you do not remain in that profession. On the other hand, if you have definitely decided to leave your original vocation, and to seek a career in commercial aviation, you will stand a better chance of success if you take a course of aeronautical engineering before entering the commercial world. The Appointments Department of the Ministry of Labour would, no doubt, help you in this matter. Although you possess such excellent Service experience, if you seek immediate employment in civilian aviation you may only be offered an

ordinary pilot's job. Of course, you can apply to the leading aircraft companies and may be fortunate in obtaining just the post you are seeking, but in the long-run the best-qualified man gets ahead of others.

R. R.—Unfortunately very few ex-Service pilots are likely to obtain immediate employment as civilian pilots. You should register your name with Messrs. Handley Page, Ltd., 110, Cricklewood Lane, N.W.2. State fully your qualifications, in addition to your flying experience.

E. A. P., CHIEF MECHANIC.—There are very few openings in civilian aviation at present. You will be best advised to seek immediate employment in the motor trade, in which the prospects are better now than they have ever been.

R. G. R., DRAUGHTSMAN.—We can only advise you to watch the advertisements in FLIGHT and engineering papers. You should have no difficulty in finding immediate employment as a draughtsman, but you would be unwise to stipulate aircraft work only, as vacancies in the latter are necessarily limited.

D. T.—Your query should be addressed to the Secretary, Air Ministry, Strand, W.C.2.

E. L. P.—It will take some time before commercial aviation expands to the extent of requiring specialised land signalmen; nevertheless, we consider your suggestion quite sound.

## THE ROLL OF HONOUR

Published April 28

Previously reported Missing, now reported Killed  
Webster, Lieut. J.

Previously reported Missing, now reported Died of Wounds  
Nunan, Sec. Lieut. N. D.

Died of Injuries

Hutton, Lieut. W. D. C. Minors, Capt. R. T.

Died

McCulloch, Capt. R.S.C. Ratey, Capt. H. A.

Wounded

Mackenzie, Lieut. K. I

Killed

Craig, Cadet.

Published April 29

Released Prisoner from Germany arrived in England

McIntyre, Lt. D. H., Arg. and Suth'd Highrs. (attd. R.F.C.)

Repatriated

The following officers of the R.A.F. have been repatriated:—

Candy, Sec. Lieut. F. B.  
Coleman, Sec. Lieut. O. E.

Freeman, Sec. Lieut. J.



## SIDE-WINDS

Now that civil aviation is definitely going to start, an opportunity occurs for those who wish to replenish their stock of spare parts on advantageous terms. The Aircraft Equipment Section of the M.O.M. Surplus Property Disposal Board has on hand a large assortment of material, components and fittings. It is impossible to give a complete list, but the following are a few of the items which are available in varying quantities: small bolts and nuts, strainers for brake controls, wire cables, wood screws, brass and iron, studs (various sizes), brass union connections, relief valves, petrol filters, copper and steel tubing, washers, rivets in all metals, joint pins, fork joints (steel), petrol tank fittings, Bowden controls and wires, brass cocks, hose pipe connections and clips, gimp pins for trimmings, accumulators, aluminium, duralumin and brass beadings, sheets, angles, etc., celluloid sheets for windows, acetylene lamps, electric switches, speaking tubes. Enquiries for any of these items should be sent to Room 544, Aircraft Equipment Section, Surplus Government Property Disposal Board, 544, Alexandra House, Kingsway, W.C. 2.

It should be noted that the Sopwith Aviation Co., Ltd., has now enlarged its style to the Sopwith Aviation and Engineering Co., Ltd.

MESSRS. LEOPOLD WALFORD (LONDON), LTD., 29, Great St. Helen's, E.C. 3, have been appointed official freight and passenger agents by Messrs. Handley Page, Ltd., for their aerial services to all parts of the world. At an early date Messrs. Walford will announce full particulars of the various services and rates. The numerous organisations of Messrs.

Walford in the United Kingdom, France, Canada, United States, Australia, India, Africa, Italy, Japan, China, South America, etc., will be at the service of the public in combination with their shipping and forwarding offices. All enquiries are promised prompt attention.

MESSRS. HANDLEY PAGE, LTD., have also appointed Messrs. Lavington Bros., Ltd., of 68 and 69, Old Bailey, to act as official agents for the freight and passenger aerial services to all parts of the world. Whilst inland services will be started in the near future, it is hoped that the services to centres abroad will be inaugurated within a short time of the signing of Peace.

WITH characteristic enterprise, Mr. Albert de Courville and Mr. Harry Tate have arranged with Mr. Handley Page for a Handley Page aeroplane in which Mr. Tate and his company will tour the world.

It is intended that the company consist of eight people, and they will carry with them all the necessary scenery and equipment for *Motoring* and other sketches. A start will probably be made from Cricklewood in September, and if the tour proceeds according to plan, the first halt will be at Gibraltar, where two evening performances are to be given. At Malta there will be a halt for two days, and then the machine will fly to Colombo, where the company will remain for a week before the journey to India is resumed. All the principal centres of India will be visited by air.

China and Japan will be next on the list, and, finally, the chief cities of the United States, beginning with San Francisco and ending with New York, will be included.

### PUBLICATIONS RECEIVED

*Ruston Aircraft Production: A Souvenir of Ruston's 1,000th Aeroplane.* Ruston and Hornsby, Ltd., Lincoln.

*Air Pie: The Royal Air Force Annual.* Edited by W. Kean Seymour and Cadet C. Palmer, R.A.F. London: Cecil Palmer and Hayward, Oakley House, Bloomsbury Street, W.C. 1. Price 5s. net.

*Our First Airways.* By C. Grahame-White and H. Harper. With illustrations by Geoffrey Watson. London: John Lane. Price 6s. 6d. net.

*The Tenants' Emergency Charter, under the Rent Restriction Acts.* London: Oliver and Boyd, 33, Paternoster Row, E.C. 4.

*The Medical and Surgical Aspects of Aviation.* By H. Graeme Anderson, M.B., Ch.B., F.R.C.S. London: Henry Frowde and Hodder and Stoughton. Price 12s. net.

*Meteorologia Aeronautica.* By Prof. Giuseppe Crestani. Italy: Ulrico Hoepli, Libraio della Real Casa, Milan. Price Lire 8.50.

*Airman's International Dictionary (English-French-Italian-German).* By Lieut. Mario M. Dander, R. Ital. F.C. Italy: Ulrico Hoepli, Milan. Price Lire 6.50.

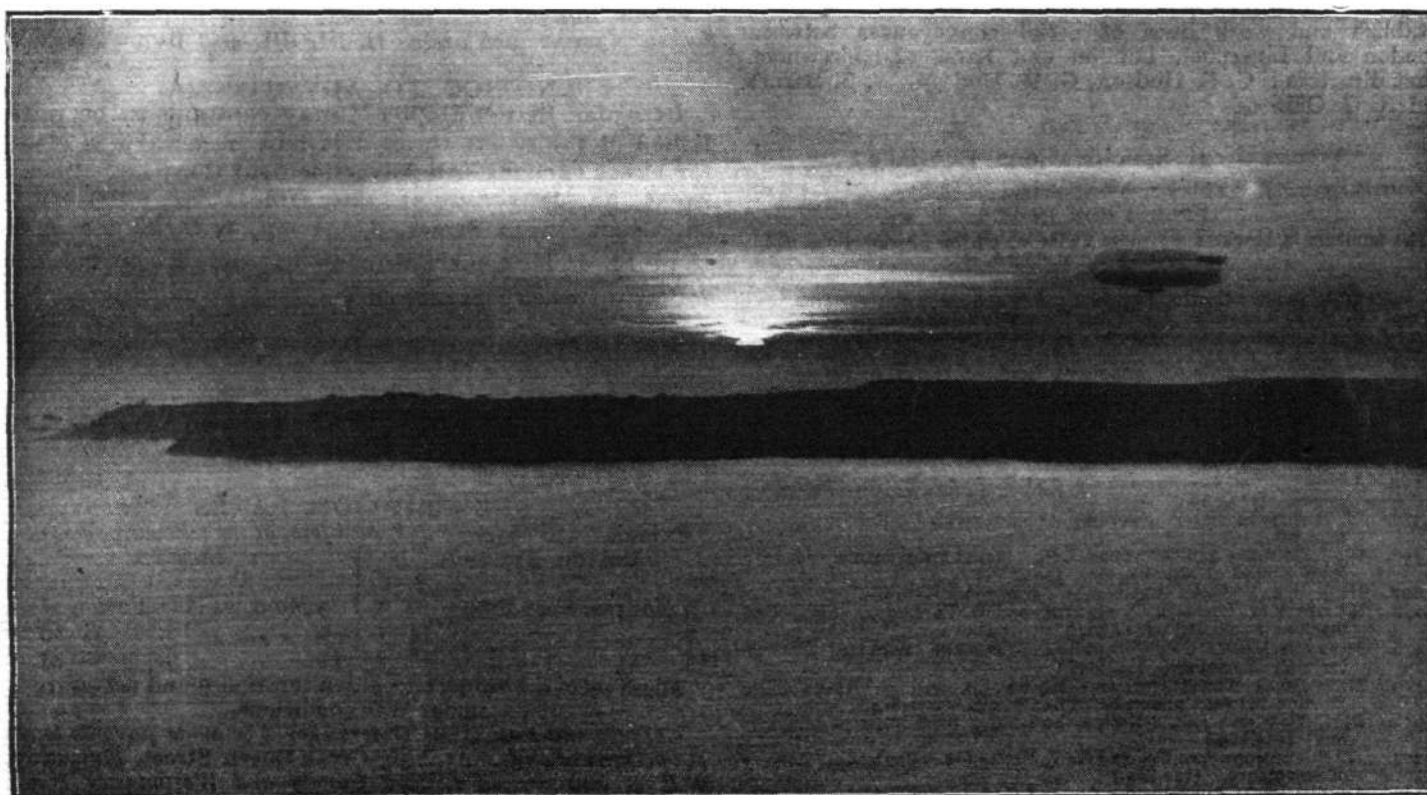
*L'Aviazione.* By Ing. E. Garuffa. Italy: Ulrico Hoepli, Milan. Price Lire 20.

*The Craft of the Propeller Maker.* W. D. Oddy and Co., Globe Road, Leeds.

*West and East with the E.F.C. Expeditionary Force Canteens.* By Capt. E. Vredenburg, late 10th London Regt. London: Raphael Tuck and Sons, Ltd.

### Catalogue

*Supplementary Clothing List, 1919.* The East London Rubber Co., 31 and 33, Great Eastern Street, E.C.



AN AIR IDYLL.—The Land's End.

## COMPANY MATTERS

AERO STATIONS, LIMITED, announce a dividend of 10 per cent. on the year's trading.

### NEW COMPANIES REGISTERED

ASSOCIATED AIRCRAFTS, LTD., 97, New Bond Street, W. 1.—Capital £100, in £1 shares. Designers and manufacturers of aircraft, cabinet work and machinery, etc.

CLARIDGE'S (DOVER). LTD.—Capital £5,000, in £1 shares. Acquiring business carried on at 142, Union Road, Dover, by V. A. Claridge, sheet metal workers, manufacturers of and dealers in motor accessories for land, air or seacraft, etc. Directors: V. A. Claridge, W. Hollis.

R. F. FUGGLE, LTD.—Capital £4,000, in £1 shares. Acquiring business carried on at Edgware and Elstree as "R. F. Fuggle," of manufacturers and sellers of electric, steam, gas, oil and other engines for motor vehicles, aircraft, etc. First directors: R. F. Fuggle and R. E. F. Sneath.

A. E. MAXEY, LTD., 69, Aswell Street, Louth, Lincs.—Capital £3,000, in £1 shares. Timber merchants, brokers, etc., dealers in wood for aircraft and other purposes, etc.

NORTH SEA AERIAL NAVIGATION CO., LTD., Olympia, Roundhay Road, Leeds.—Capital £10,000, in £1 shares. Objects: To carry on the business of civil aerial trading transport and navigation, aircraft designing and construction, flying instruction, etc. First directors: R. Blackburn and S. A. Hirst.

G. W. PEARCE AND SONS (BRASSFOUNDERS), LTD.—Capital £5,000, in £1 shares. Acquiring business of brassfounders, manufacturers of, and dealers in, aeroplanes and motor vehicles, etc., carried on by G. W. Pearce and Sons, Ltd., at 94, Aston Road, Birmingham. First directors: G. H. Pearce, C. Pearce, and A. E. Jones.

J. F. AND R. PLATT, LTD.—Capital £10,000, in £1 shares. Mechanical, aircraft and general engineers. First directors: J. Platt, F. J. Platt and R. E. Platt. Solicitors: Denton, Hall and Burgin, Gray's Inn, W.C. 1.

STANFIELD (COSMOS), LTD.—Capital £35,000, in £1 shares (15,000 preference). Acquiring business of J. R. M. Stanfield, Ltd. (under agreements with Cosmos Consolidated, Ltd.), mechanical, motor and general engineers, aircraft manufacturers, etc. First directors: H. T. Box, J. R. M. Stanfield, T. W. Ellis, J. A. Taylor and F. Cory Yeo.

TAUNTON, LINDSAY AND CO., LTD.—Capital £10,000, in 9,000 10 per cent. participating preference shares of £1 each, and 20,000 deferred shares of 1s. each. Manufacturers of, and dealers in, aeroplane engines, aeroplanes, motor cars, etc., under agreement with J. B. Taunton, of 98, Victoria Street, S.W. Permanent directors: J. B. Taunton and Capt. J. M. Lindsay.

UNITED SERVICES AUTOMOBILE AND ENGINEERING CO., LTD., Shorncliffe Station Garage, Cheriton Road, Folkestone.—Capital £10,000, in £1 shares. Motor garage proprietors, motor vehicle manufacturers, etc., also to establish and work lines of aerial conveyances between London and Liverpool, London and Paris, and elsewhere. First directors: G. C. Hudson, G. M. Hudson, W. S. Barnes and R. G. Old.

### Aeronautical Specifications Published

Abbreviations:—cyl. = cylinder; I.C. = internal combustion; m. = meters.

#### APPLIED FOR IN 1916

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published May 1, 1919

71. T. F. TESSE. Coating-composition for aeroplane cloths. (124,763.)  
3,899. G. F. T. PHILLIPS. Apparatus for determining altitude of aircraft. (124,767.)  
4,174. W. and T. AVERY, G. C. VYLE and S. HOLROYD. Apparatus for testing tractive or propulsive force of motor and propeller. (124,773.)  
4,395. MARTINSYDE, LTD., H. P. MARTIN and O. D. LUCAS. Control of machine guns, etc. (124,777.)  
4,406. Sir A. T. DAWSON and G. T. BUCKHAM. Sight for anti-aircraft guns. (124,778.)  
4,501. AERONAUTICAL INSTRUMENT CO. and G. BREWER. Air-speed indicators. (124,783.)  
4,516. W. MORTIMER and F. POTTEN. Apparatus for landing of aircraft. (124,785.)  
4,556. W. T. COULSON and OPTALYTE, LTD. Means for determining height from ground of aircraft, etc. (124,787.)  
4,607. H. S. PECK. Aerial dart bombs. (124,790.)  
5,137. MARTINSYDE, LTD., H. P. MARTIN and O. D. LUCAS. Control of machine guns, etc. (124,802.)  
5,428. SUNBEAM MOTOR CAR CO. and L. COATALEN. Fuel-feed systems for aircraft engines. (124,808.)  
5,709. BLACKBURN AEROPLANE AND MOTOR CO. and R. BLACKBURN. Bracing between planes of triplanes, etc. (124,815.)  
5,857. B. I. DAY and ROLLS-ROYCE, LTD. Car framework of airships, etc. (124,819.)  
5,925. W. BEARDMORE AND CO. and G. T. RICHARDS. Controlling devices of aeroplanes. (124,822.)  
6,116. AERONAUTICAL INSTRUMENT CO. and G. BREWER. Air speed indicators. (124,827.)

- 6,227. A. V. ROE. Tilting mechanism for tail planes. (124,832.)  
6,278. VICKERS, LTD., G. H. CHALLENGER and H. A. SAVAGE. Aircraft. (124,834.)  
6,280. VICKERS, LTD., G. H. CHALLENGER and H. A. SAVAGE. Aircraft. (124,835.)

#### APPLIED FOR IN 1917

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published May 1, 1919

- 4,284. T. F. TESSE. Treatment of aeroplane fabrics. (124,844.)  
8,070. DAVIDSON AVIATION CO., W. E. CHESTER and L. MORGAN. Metal propeller bush for aircraft. (124,845.)

#### APPLIED FOR IN 1918

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published April 24, 1919.

- 4,522. D. W. BROWN. Hydro-aeroplanes. (124,547.)  
5,370. J. G. A. KITCHEN. Varying speed and stopping way of aircraft without slowing propeller. (124,572.)  
6,385. J. R. KEMP. Level-indicator for aircraft. (124,606.)  
6,391. H. W. HETHERINGTON. Flying machines. (124,607.)  
8,766. J. and D. A. OGILVIE. Glueing cramps for propeller blades, etc. (124,633.)  
9,455. A. LEES AND CO. and L. DUNKERLEY. Machines for forming propeller blades, etc. (124,643.)  
12,645. F. BAKER. Parachutes. (124,677.)  
Published May 1, 1919  
1,803. L. BYGRAVE. Sights for use on aircraft. (124,857.)  
3,058. J. D. LUMSDEN, R. W. R. MACKENZIE, E. H. ROBINSON and M. FORT. Aeroplane wings, etc. (124,861.)  
5,498. R. ALLEN. Gun mountings for aeroplanes. (124,872.)  
5,813. W. G. TARRANT and W. H. BARLING. Steering of aircraft. (124,893.)  
5,814. W. G. TARRANT and E. BOUILLON. Means for operating stabilising or steering devices for aeroplanes. (124,894.)  
7,225. S. DRZEWIECKI and J. REY. Self-setting sails or blades of propellers. (124,935.)  
7,676. H. E. WATKINS. Aeroplane level or position indicators. (124,939.)  
9,612. W. G. TARRANT. Attachment of coverings to wind framing, etc., of aeroplanes. (124,966.)  
11,298. BLACKBURN AEROPLANE AND MOTOR CO. and G. CHAPMAN. Jigs. (124,989.)  
13,227. E. A. MASTERMAN. Mooring-devices for airships. (125,003.)  
16,892. FAIRY AVIATION CO. and C. R. FAIRY. Securing fittings to aircraft spars. (125,019.)  
17,004. G. J. E. BLONDEAU. Fuel-supply devices for aircraft engines. (125,023.)

#### APPLIED FOR IN 1919

The numbers in brackets are those under which the Specifications will be printed and abridged

Published May 1, 1919

- 2,383. STABILIMENTI BIAK-ING. A. POUCHAIN. Aeroplane undercarriage axle. (123,074.)  
4,050. STABILIMENTI BIAK-ING. A. POUCHAIN. Axle for aeroplane undercarriage. (123,748.)



The 8-page Index for Vol. X of "FLIGHT" (January to December, 1918) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 8d. per copy, post free.

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages li, lii, liii, and liv).

### NOTICE TO ADVERTISERS

IN order that "FLIGHT" may continue to be published at the usual time, it is now necessary to close for Press earlier. All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

## FLIGHT

and The Aircraft Engineer.

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.  
Telegraphic address: Truditor, Westcent, London.  
Telephone: Gerrard 1828.

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6 "	14	1		6 "	16	6	
12 "	28	2		12 "	33	0	

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